The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Science of Costing

THE papers read by Mr. F. M. Potter and Mr. H. C. Marris on "Chemical Works Costs" at the Chemical Engineering Group's conference on Thursday evening are useful contributions on a subject which is engaging increasing attention in the chemical industry. The primary aim is not so much cheapness as efficiency of manufacture, which is, of course, the best form of cheapness. The idea is not only to see that the raw materials are well bought to begin with, but that they are turned to the fullest possible account. Similarly with labour, it is necessary to see that it is not only good in itself but is made the most effective use of. Only in this way can wastage and overlapping be avoided, and costing tends very distinctly to produce efficiency by recording the use of all the elements involved in production. As Mr. Potter remarks, the methods of costing indicated in his paper cannot be installed at once, but represent a high objective towards which steady progress can be made. To make useful deductions from the costs returns it is necessary to have a clear knowledge not only of the method of compiling them but an understanding of the process and of the materials involved.

Mr. H. C. Marris rather picturesquely sums up the case in one paragraph—"With a satisfactory costing system properly used the workpeople are better controlled and more economically employed, the foremen are kept up to their work and are given a useful tool for fulfilling their duties, whilst it is brought home to the management by the reiteration of costs, costs, costs, that the manufacture of chemicals is but a secondary purpose of a chemical works, the primary one being to make dividends." What will particularly interest works or process chemists is the suggestion that costing will ultimately become the work, not of the ordinary accountant but of the specialist. "Will not," he asks, "the costings in future lie in the hands of the technical man, especially the technical chemist, who will take costings as an essential part of his ordinary training?" The idea is quite in line with the tendency to make the chemist less and less a doctrinaire and more and more a trained man of business.

Dry Elutriation of Cement Dusts

IN view of the interest which was centred round, and the hopes which were at one time cherished as to the recovery of potash from certain industrial processes in this country, it is instructive to refer to some experimental work in connection with the recovery of potash from cement dust which has lately appeared in one of our American contemporaries. Cement dust has been shown to be potentially a very important source of American potash, but production costs, as elsewhere, seem to indicate that the technique of the recovery of potash therefrom has not been sufficiently developed as to render the process attractive from a commercial point of view. Two American workers, Messrs. E. J. Fox and C. W. Whittaker, bearing this point in view, recently started out to investigate this particular phase of the problem in an endeavour to determine whether more efficient methods of recovery could be devised. Briefly, it may be recalled that the potash volatilised in cement kilns escapes from the charge as a vapour, and as such is carried along with the gas stream issuing from the kiln until the temperature drops to a point where the potash condenses, after which it exists as minute particles of potash salts in a highly dispersed state. When an electrostatic precipitation plant is interposed, all the dust particles and the greater part of the potash are brought down together. It will be generally agreed that, owing to the inherent difficulties which beset any wet method of separation, success can only be looked for in some direction other than that of utilising water as a means of separation, for if a dry system is employed no elaborate equipment

for treating the dust with water is required, while a dry process would eliminate everything in the way of evaporating and crystallising problems.

In order to accomplish this end the American workers determined to experiment with elutriation in media that would not react with potash or the cement dust. In other words, air was used as a medium. It is not necessary to describe here in detail the construction of the elutriator employed, but it may be mentioned that a current of compressed air is forced through a nozzle which directs it downwards and with such force that the dust lying in the bottom of the apparatus is lifted and forced upwards through a stack. The particles which are small enough to be carried along by the air velocity employed are borne away over the top of the stack and arrested in a collector. On the other hand, those particles which are too heavy to be lifted by the air current fall backwards into a lower receptacle in the apparatus, separation of light and heavy particles being thus attained. From a number of experiments which were conducted at various cement works the interesting facts emerged that the potash fume is not merely mixed with the dust but is deposited on the particles, that its distribution over all surfaces is apparently equal, and that in all samples examined the potash content decreased as the size of the particles increased. Accordingly, by employing a system of air elutriation of this nature it was found possible to obtain cement dusts the potash contents of which were approximately double those of the original. The process is, therefore, one of importance, not only on account of the improvement in concentration, but by reason of the freedom from water elutriation which it embodies.

The Expert Chemical Witness

We fear it was the ideal expert witness, rather than the actual one, that Sir William Willcox sketched in his Manchester address last week, for as long as it is the custom for opposing sides to engage experts to put forward opposing doctrines something of the *ex parte* spirit is bound to remain. This does not necessarily imply lack of honesty, for as the sincere lawyer is able to assure one, there is always something to be honestly said for any side, and if the expert witness takes the view of the barrister that his business is to state his own side's case and to leave the other side to state theirs, with the Court holding the balance between, he would merely be engaging in the ordinary tug-of-war by which causes are decided in the courts. Sir William Willcox, however, sets up a very much higher conception than this. The chemical expert, who is called in a criminal or civil action, is, in his view, simply a witness for scientific truth, not interested in the winning or losing of a case, but solely concerned in putting the truth, the whole truth, and nothing but the truth before the Court. In practice our eminent experts may occasionally fall a point or two below this, but it is well to keep the ideal before them, and most of them, we are well assured, sincerely aim at attaining it.

The technical hints dropped by Sir William are well worth the attention of chemists whose reputation brings them into the witness-box. Some of the best experts may be the worst of witnesses. What is really needed is something of the logical legal mind, which appreciates the central issue in a case, distinguishes the relevant matter bearing on it from the irrelevant, and confines itself to relevant, clear, and, as far as possible, brief answers to questions. The discursive witness whose answer, instead of being a simple "Yes" or "No," consists of a short lecture is bad enough, but of all witnesses perhaps the too clever one is the worst. A clumsy but obviously honest witness may often decide the issue but the witness who fences with counsel and whose manner suggests reserve discounts his own testimony almost in advance, in addition to irritating judge, counsel and jury. The witness whose testimony counts most is the one who honestly tries to assist the Court to the truth.

Testing Metal for Flaws

The tracing of the cause of the recent fatal railway accident at Lytham to a defective tyre directs attention to the methods of testing vital metal parts used in various kinds of machinery. The surface of the fracture of the tyre was stated by Mr. G. Hughes, the chief mechanical engineer of the L.M. and S. Railway, at the inquiry, to consist of good metal with the exception of a flaw in the centre of the tread of the tyre. This flaw had an area of just over 1 sq. in., and formed about 8 per cent. of the area of the fracture. It was not a segregation, but had a hollow centre. The ordinary tests carried out when the tyre was made showed that the steel had a satisfactory chemical composition, sulphur being present to the extent of ·04 per cent. against ·05 per cent. allowed, and the phosphorus content being ·05 per cent., the maximum permissible The falling weight test given to three tyres out of 34 from the one heat had shown that the steel was rather hard and did not possess quite the deflection it should have. The tyres were therefore re-annealed to soften them slightly, and the falling weight test was then passed satisfactorily.

Mr. Hughes stated that a flaw of the kind that existed could not possibly have been discovered and that there was no record of a similar flaw. Nevertheless, tyres do break occasionally in use due to flaws of one kind and another, and it would seem to be a matter of some importance if faulty tyres could be detected beforehand. The occurrence of such flaws in forged steel is admittedly rare, but in cast steel they are much more frequent, and a method of detecting them has been developed in the United States by a firm making petroleum distillation plant. The method, which was referred to in our Metallurgical Section, is a simple one depending on the use of X-rays, and has been most successful in detecting segregations, blow holes, and other faults. This test would undoubtedly have shown up the flaw in the faulty tyre, but the principal value of the method lies in the information it is able to give of the formation of such flaws, and this information should lead to methods of manufacture which will eventually eliminate them. In view of the occurrence of similar flaws occasionally in forged articles it would probably provide the manufacturer with equally valuable information if he could have the use of an X-ray plant of the same type. It should

not be a difficult matter to develop a method of testing forged parts rapidly in ordinary production if that were considered worth while, but what is really required is more accurate knowledge of their causation, and special research with the aid of X-ray apparatus would seem to be a promising direction to follow towards this end.

Exchange Chemical Professorships

THE suggestion put forward by the official journal of the American Chemical Society in favour of exchange chemical professorships between Great Britain and the United States will appeal to many, not merely on broad international grounds, but on account of the mutual scientific benefit that would accrue to both sides. Already there is a considerable amount of unofficial exchange, and the step proposed would be only an extension of an existing practice. "We believe," says the journal, "that much of mutual advantage could be gained if several exchange professorships could be established, particularly between Great Britain and the United States. Our leaders in chemistry have quite as much to offer our friends overseas as we know their professors can bring to us. A year's contact with the long-established institutions in Great Britain would be of the greatest benefit to many of our professors, while intimate contact for a similar length of time with the American system of higher education must give rise to ideas of substantial value to our British friends. We could name half-a-dozen British chemists who have already endeared themselves to the American Chemical Society, who present their subjects in faultless manner, and whose presence would be a great inspiration to those specialising in their fields of work. No doubt they, in turn, could easily select from the rapidly increasing number of outstanding men among us those for whom their authorities would be glad to exchange service. Our reference to professors in British schools must not be taken as a criticism of those who come to us from other lands; for we welcome them, profit greatly from their discussions, and are sincerely interested in their work. It must be admitted, however, that the differences in our languages and our different points of view on a variety of subjects tend to limit the interest which might be aroused in the average student body, although they are of no importance where research professorships are concerned or where extended discussions in small circles are possible."

Science and Human Effort

THE application of scientific principles to the organisation of human effort is a question which, politics apart, is of equally vital concern to us all. In this connections, *Science and Labour* (Ernest Benn, Ltd., 7s. 6d.) should be heartily welcomed. The volume is a collection of the principal speeches and papers given at the Conference on Science and Labour initiated by the British Science Guild and held at the Empire Exhibition.

The contributors include Sir Richard Gregory, Sir Richard Glazebrook, Lord Askwith, Mr. Hugo Hirst, Sir Oliver Lodge, Mr. C. T. Cramp, Lord Ashfield, Miss Margaret Bondfield, Sir Arthur Newsholme, Mr. Arthur Greenwood, M.P., and Mr. R. H. Tawney.

Points from Our News Pages

Small electrolysers for producing hypochlorite form the subject of an article (p. 490).

Letters are published on "Chemical Advertising Methods" (Bertram Ward) and "The Luton Chemical Dispute" (B. Laporte, Ltd.) (p. 492).

"The Chemist and the Fermentation Industries" is the subject of the 7th annual Streatfeild lecture reported on page 493.

Sir William Willcox gives an interesting survey of chemical research and medical practice (p. 495) and offers valuable guidance to the correct attitude of the expert in the witness box (p. 499).

The Dyers' Wages Award is noticed on page 497.

Our London market notes an expansion in the volume of trade; greater confidence is apparent in all directions (p. 506).

Our Scottish market report reveals a decidedly better tone in the Heavy Chemical market, and prices show an upward tendency in a number of instances (p. 509).

The Calendar

Nov.		
17	Faraday Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London.
17	Chemical Industry Club: 8 p.m.	2, Whitehall Court, London.
17	Society of Chemical Industry: Joint meeting with the Institution of the Rubber Industry. "Latex: Its Chemistry and the Development of its Industrial Applications." A. van Rossem.	Engineers' Club, Coventry Street, London.
17	University of Birmingham Chemical Society: "The Chemistry of Blood." S. H. Edgar. 5.30 p.m.	Chemical Lecture Theatre, Edgbaston.
18	Northern Polytechnic Chemical Association: "Research and Industry." Dr. J. T. Dunn. 8 p.m.	Holloway.
18	Royal Photographic Society: Communications from the Research Laboratory of the Eastman Kodak Co., L. F. Davidson, and the Cambridge Instrument Co. 7 p.m.	35, Russell Square, London, W.C.1
19	Society of Glass Technology.	Leeds.
19	Institute of Chemistry (London Section): Discussion on "The Standardisation of Scientific Glassware, with Particular Reference to Units of Volume," to be opened by Dr. J. J. Fox and V. Stott. 8 p.m.	30, Russell Square, London.
19	Society of Chemical Industry (Edinburgh Section)—Joint meeting with the Institute of Chemistry: "The Profession of Chemistry." Professor G. G. Henderson. 8 p.m.	Caledonian Station Hotel.
19	Society of Glass Technology: Papers by F. Buckley, Professor W. E. S. Turner, H. S. Houldsworth, and A. Cousen. 3 p.m.	The University, Leeds.
19	Society of Chemical Industry (Newcastle Section) and North of England Gas Managers' Association: "The Combustion of Coke in one Stage." Dr. Geoffrey Weyman. 7 p.m.	Chemical Lecture Theatre, Armstrong College
20	Chemical Society: Papers by F. Challenger, J. R. A. Jinks, J. Haslam, and T. H. Bott. 8 p.m.	Burlington House, Piccadilly, London.
21	Institute of Metals (Sheffield Section): "Non-Ferrous Metals in the Foundry." A. Marks. 7.30 p.m.	198, West Street, Sheffield.
21	Society of Dyers and Colourists (Manchester Section): "Further Observations Relating to the Action of Heat on Cotton Fabrics." Professor E. Knecht and E. F. Muller. "The Interaction of Glucose and Methylene Blue in an Alkaline Medium." Professor E. Knecht and Miss E. Hibbert. 7 p.m.	36, George Street, Manchester.
24	Royal Society of Arts: Cantor Lecture I.—"Modern Colour Problems." Dr. L. C. Martin. 8 p.m.	John Street, Adelphi, London, W.C.2.

Small Electrolysers for Producing Hypochlorite

The article below describes two patterns of electrolytic cell for producing hypochlorites from brine when it is inconvenient to store chlorine disinfectants owing to climatic or other conditions. The cells are now past the experimental stage and are proving successful in use in India and elsewhere.

AMONGST the many important developments in present-day practice in the various chemical fields of Great Britain, the introduction of electrolysers for bleaching and sanitary purposes, etc., calls for special attention.

In the original construction of electrolysers for sodium hypochlorite, the electrodes were made of platinum-iridium, which is practically indestructible. Excellent results have been obtained from these electrolysers, but the extraordinary increase in the cost of platinum-iridium has made its continued use almost prohibitive. The makers therefore turned their interests to graphitic carbon, necessary improvements being made, with the result that a much cheaper form of electrode has been used with effective results.

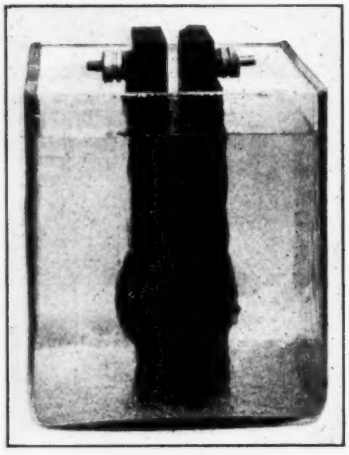


FIG. 1.—PLATINODE ELECTRODE IN GLASS CONTAINER.

In these electrolysers the brine is continuously circulated through the electrolytic cells, the circulation being automatically induced by the design of the cell itself. A rapid current of liquor is thereby maintained through the individual cells, with the result that back E.M.F. from gas bubbles is reduced to a minimum, and any lingering of liquor in the cells, which would inevitably be accompanied by overheating of the hypochlorite and consequent diminished output, is completely prevented.

The "Platinode" Electrolyser

Having briefly explained the purpose of these electrolysers, the following description as to their construction should prove

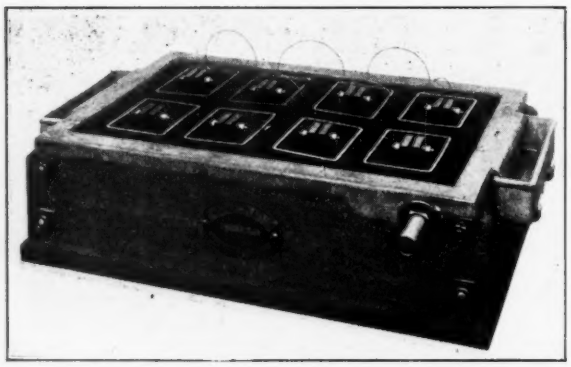


FIG. 2.—EIGHT-CELL PLATINODE ELECTROLYSER SET WITH LEAD-LINED COOLING TANK.

of interest. We will first of all deal with the "Platinode" electrolyser. This type is designed to prepare stable sodium hypochlorite solution with high concentration of available chlorine (as high as 5 per cent.) when desired. A strength greater than 2 per cent. available chlorine is, however, rarely necessary; the electrolyser will produce hypochlorite of this strength very steadily and effectively.

This type of electrolyser consists of an ebonite cell, with electrodes of platinum built into the body of the cell so as to afford the maximum protection from accidental injury. Silver-plated terminals are provided for connecting to the control apparatus. The whole construction of the cell is designed to minimise wear, and to provide an automatic circulation which prevents local overheating and decomposition of the liquid. The provision of platinum electrodes and their adequate protection of necessity raise the first cost of the apparatus, but the ultimate economy and reliability in working are most pronounced.

A Platinode cell unit consists of an ebonite cell standing in a glass container, Fig. 1. The cell requires a current of 5 amperes, and absorbs from 10-12 volts. Individual cell units may be built up to any number of cells in series, according to the voltage available. An eight-cell electrolyser set, standing in a cooling tank through which water circulates, is shown in Fig. 2. To operate such a set, all that is necessary is to fill each glass container with strong brine (20 per cent. to 30 per cent.) to switch on the current, and to adjust the variable resistance so that the ammeter shows a current of 5 amperes. The set may then be left without further attention. Each cell holds 1,300 c.c. (rather more than one-quarter gallon) and each run of four-and-a-half hours produces from each cell this quantity of sodium hypochlorite solution containing two per cent. available chlorine. These figures are very conservative, and may easily be reached under tropical conditions. Smaller outputs of hypochlorite solution at higher concentration are obtainable by suitable modification of the brine strength and the length of the run. Very little attention is neecssary at the commencement and end of each run; none at all is necessary during the greater portion of the run.

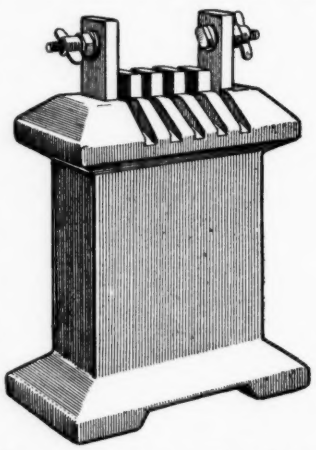


FIG. 3.—GRAPHODE ELECTRODE. (5 Ampere size.)

The "Graphode" Cell

The other type of electrolyser is the "Graphode." This type has electrodes of graphite instead of platinum. The electrodes are simple in shape, and slip easily into position, so that they are readily renewable as they wear away. They are arranged in a stiffened holder of chlorine-resisting vulcanite, so shaped as to effect a rapid and thorough automatic circulation of the electrolyte through the cells. This circulation, which is necessary to avoid local overheating and its consequent trouble, is obtained in the Graphode electrolyser without recourse to pumps or other auxiliary circulating apparatus.

Special precautions in design have been taken to prevent current leakage from cell to cell. The efficiency is high, and the rated outputs may easily be reached, even under the trying conditions of tropical countries. The makers have standardised four sizes of Graphode electrolysers taking respectively 5 amperes, 12½ amperes, 30 amperes and 60 amperes.

The electrolyser shown in Fig. 3 is the 5 ampere size, suitable for general sanitary work, for water purification, etc. It consists of a stout holder, with graphite electrodes form five compact cells. The whole is placed in a glass container holding about one gallon of liquid. Brine of 12 per cent. to 15 per cent. solution is used and the current is adjusted to 5 amperes, when the electrolyser yields about one gallon of sodium hypochlorite at a strength of one per cent. available chlorine after a run of three hours. The voltage absorbed by each electrolyser is 22-24 volts when new, so that four can be connected in series on 110 volts supply, and eight in series on 220 volts.

The 12½ ampere size is specially suitable for general sanitary work, for water purification, etc. It consists of a stout holder,

with graphite electrodes, forming eight cells, generally similar to the 30 amperes size described below. Brine of 12½ per cent. to 15 per cent. solution is used, and the current to 12½ amperes. At this rate 6¼ litres of solution containing one per cent. of available chlorine is produced per hour. The voltage absorbed by each electrolyser when new is 40-45 volts, and two may be connected in series on 110 volts supply, and four in series on 220 volts.

The 30 amperes size of electroyser is intended for work in large hospitals, tea gardens, rubber estates, for water purification, and for use in laundries, small bleaching works, etc. This electrolyser consists of a vulcanite holder, with graphite electrodes, forming light compact cells. The whole stands in a vulcanite container, and is almost immersed in the electrolyte. Cooling coils of lead pipe are provided in the containing tank. With brine of 12½ per cent. to 15 per cent. solution, an output of 16 litres (3½ gallons) per hour of sodium hypochlorite, with a concentration of one per cent. of available chlorine, is obtained. The voltage absorbed is 40-45 volts when new; two of these electrolysers may be connected in series on 110 volts supply, and four on 220 volts.

It is a matter of interest that during the war, when the *Mauretania* was a hospital ship, a similar type of electrolyser was introduced by Dr. Dakin, a well-known authority upon antiseptics. Previous to its introduction the incidence of tropical diseases, chiefly water-borne, was very high amongst the patients, but after the introduction of the electrolyser and the liberal use of the sanitary fluid produced, the number of cases diminished to zero. Dr. Dakin has placed this fact on record amongst his published papers on "Military Hygiene." This cell worked direct with sea water.

Reviews

THE CORROSION OF METALS. By Ulick R. Evans, M.A. London: Edward Arnold and Co. Pp. 212. 14s.

Since the publication in 1910 of Cushman and Gardner's work, "The Corrosion and Preservation of Iron and Steel," technical literature has contained much relating to the problem of corrosion generally, but comparatively little which has broadened our theoretical conceptions of the mechanism of the associated phenomena. The appearance of Cushman and Gardner's work may be said to have established the electrolytic or electrochemical theory of corrosion as the most satisfactory hypothesis up to then advanced, although it has since become increasingly evident that the development of this theory has lagged very considerably behind the accumulation of observations and recorded facts concerning the varied phenomena encountered in corrosion.

From 1921 up to date, Mr. Evans's contributions to the current literature have been of special interest to all who are brought into contact with corrosion problems in that they have attempted to establish causes and not, as has done most of the contemporary literature, to merely enumerate and record facts and observations. The author states in his opening chapter that "there has been a tendency for—work on corrosion to aim at ascertaining the facts empirically without unduly troubling about causes."

This statement indicates excellently the nature of the work. It is largely theoretical, extending and elaborating the electrochemical theory of corrosion which may now be regarded as a thoroughly workable and practical theory, and which, when correctly interpreted and applied, provides a sound and logical explanation for almost all of the hitherto inexplicable and apparently capricious forms, etc., of corrosion.

The book is not confined to the problem of ferrous corrosion only, but, as indicated by the title, deals with the corrosion of metals generally.

The amplification of the electrochemical theory which is presented is largely the result of original research carried out by the author himself, who has, in fact, built up his book mainly from his own experimental data. This does not, however, preclude an extensive use of the existent bibliography, and it may perhaps be suggested that an appendixed bibliography instead of, or even in addition to, the footnotes would have given an additional value to the book.

The prevention of corrosion is dealt with specifically in the space of but thirty pages, though the text contains much from which knowledge of this aspect of the corrosion problem may be acquired. "The Corrosion of Metals" will prove a most useful, welcome and commendable addition to those other very few volumes which represent all that we have available in book form on the subject of corrosion.

A. A. POLLITT.

OUTLINES OF ORGANIC CHEMISTRY. By E. J. Holmyard, M.A., F.I.C. London: Edward Arnold and Co. 1924. Pp. 466. 7s. 6d.

Mr. Holmyard's enthusiasm for organic chemistry is inspiring. He will not admit that it is a difficult subject either to learn or to teach. The elegance of the theoretical structure, the fascinating practical technique and the great intrinsic interest of many carbon compounds all conspire, he says, to make organic chemistry one of the most delightful branches of learning which it is possible to imagine. The added joy of working with poisons which even the Borgias might have envied, with drugs and dyes, perfumes and explosives, he continues, is such that he would be a strange man who failed to succumb to the charm of organic chemistry.

Mr. Holmyard is head of the Science Department of Clifton College, and this book is written for the use of senior boys and for medical students. It is written in so clear and interesting a manner that the difficulties of the subject have been reduced as much as it is possible to reduce them by any printed expositions.

The book is divided into five parts. Part I begins with a chapter delineating the history of the development of organic chemistry, and then discusses elementary theories and methods of analysis. Part II deals with some more advanced theories, including stereoisomerism and tautomerism. Catalytic methods and reactions also receive attention. In Part III are described the paraffins and olefines, alcohols and ethers, aldehydes, amines and carbohydrates. Part IV is concerned with benzene and its homologues. Also with phenol, naphthalene, anthracene and related substances. Part V is very short and consists mainly of references to certain heterocyclic compounds containing nitrogen, sulphur or oxygen.

H. F. H.

Fuels for Heavy-oil Engines

British Standard Specification

THE British Engineering Standards Association has just issued British Standard Specifications for fuels for heavy-oil engines (Petroleum and Shale Oils, No. 209, 1924). These specifications are some of the first-fruits of the Sectional Committee on Petroleum products recently set up by the Association. Specifications are given for four grades of fuel oil, the first grade being a gas oil and the other three being non-distillate oils, all classes of heavy-oil engines thus being catered for by one or other of the four grades. Users of heavy-oil engines should satisfy themselves, by test or otherwise, which of the four grades of oil specified can most satisfactorily be utilised in any given engine, and the corresponding specification should then be adopted. There are one or two points of special interest in these specifications, namely:—

(*a*) No mention of specific gravity is made. In the past many specifications have called for a definite specific gravity and a definite viscosity, but the conclusion has been reached that it is quite unnecessary to specify the specific gravity of a fuel oil provided the viscosity characteristics are clearly defined.

(*b*) The sulphur content is not specified. While drawing up these Specifications every effort was made to obtain evidence to prove that the harmful effects attributed to oils in certain cases were due to the sulphur in the oil. Pending the production of such evidence it has been decided that, in the case of fuel oils for heavy-oil engines as distinct from fuels for use under boilers, a test for sulphur unnecessarily increases the cost of the oil.

The specifications will be revised, if necessary, in twelve months' time. The methods of testing the oil given are those adopted by the Institution of Petroleum Technologists, and are described in detail. Copies may be obtained from the B.E.S.A. Publications Department, 28, Victoria Street, London, S.W.1, price 1s. 2d. post free.

Luton Chemical Works Dispute

To the Editor of THE CHEMICAL AGE.

SIR,—So many of our friends have taken an interest in the labour dispute which occurred at these works that we thought you might like to have a few particulars. Briefly, the history of the recent trouble is as follows :—

On October 6, close upon 200 of our employees, chiefly process workers, declared a " lightning strike " to enforce the recognition of the National Drug and Chemical Union, and also to obtain a considerable increase upon the current rates of pay. On economic grounds we were unable to face the prospect of any increase in wages if we were to safeguard the future interests of the men themselves.

As manufacturers of products which are not produced elsewhere in the United Kingdom, but which are required for use both here and abroad, the extent to which we can pay wages and keep the industry alive is dominated by competition from foreign manufacturers, both in the home market and abroad. The competition from some countries, by reason of their lower wages, is inequitable, especially when one bears in mind the fact that in one country from which competition emanates, the importation of our products is prohibited on the ground that the home capacity for the manufacture is equal to the domestic demand. In other cases the home manufacturers are safeguarded by tariffs.

We have been able to meet these disabilities and yet to pay rates of wages which are at least equal to, and in many cases superior to, the rates for unskilled and semi-skilled labour in this district.

As regards the question of recognition, we thought it was illogical that any organisation should attempt to dictate conditions, when their own members, employed in other industries, were allowed to use the products of the cheap foreign labour to which we have referred, to the detriment of their other members who were employed at our works.

During the course of the dispute, the " peaceful picketing " which is practised, resolved itself into intimidation and personal violence, to which we were determined that we should not yield.

Arrangements were made to carry on our business obligations until the end of this year, but many of our ex-employees, who were members of the Union referred to, began to realise that they had been misled, and on Thursday last a large number left their Union and presented themselves for work. In view of the distress prevailing, after nearly five weeks without wages, we felt it was incumbent upon us to re-open some of the departments which were closed, and by Monday morning, the 10th instant, we had all the men we required.

We now have news to the effect that the strike is officially abandoned.—Yours, etc.,

B. LAPORTE, LTD.

Luton. November 12.

Inefficient Advertising Methods

To the Editor of THE CHEMICAL AGE.

SIR,—The note on page 469 of your issue of November 8, draws attention to the deplorable inefficiency of the bulk of chemical and allied trades advertising in this and other countries. In the course of our business we have had to investigate this neglect, by firms displaying in other directions the highest commercial acumen, to utilise advertisement space to the best advantage: In almost all cases the publishers of technical periodicals encourage efficient advertising. Often the advertisement department of a paper makes suggestions for the better utilisation of existing space. Such suggestions are rarely adopted by advertisers.

Advertising consultants have found that the chemical and allied industries maintain in general an attitude towards improved advertising varying from apathy to antipathy. The benefit accruing to certain manufacturers and merchants, themselves outstanding exceptions to this generalisation, has proved the value of extending modern advertising methods to these industries. The advertising consultant is met by the injunction to " remember that our product cannot be advertised in the same way as XXXXX cigarettes." If XXXXX Cigarettes are well advertised, their advantages are pressed in the most pleasantly arresting, the most insistently convincing, way possible.

Exactly the same applies to autoclaves or acetic acid. The distinction is not one of principle, and is controlled by the factor of appeal. In either case *knowledge of the product itself and of its uses must be added to a thorough understanding of the principles of good advertising.* Given this specialised knowledge, it is no more difficult to attune an advertisement for a highly technical product so that it be well received by the readers of THE CHEMICAL AGE, than it is to devise an advertisement for Baby Food to appeal to the readers of *The Daily Mail.*

The policy in the past has been to buy space for no other reason than that competitors also buy space. To show through that space the actual advantages to be gained by buying of the advertiser ; to present the advertisement in an arresting manner, yet without loss of dignity—these are the modern means of advertising whereby definite increase of business effected proves the value of advertising expenditure. —Yours, etc.,

J. BERTRAM WARD.
For the Technical Advertising Service.

November 11.

The Manufacture of Insulin

Mr. F. H. Carr Speaks to London Students

THE first meeting of the Northern Polytechnic Chemical Association for the present session was held on Tuesday, when a lecture was given by Mr. F. H. Carr, F.I.C., the President of the Association, on " Insulin and its Manufacture."

Mr. Carr first made a few introductory remarks in which he referred to the need for the various nations to keep pace with one another in the industrial developments in chemistry. The war had shown how dangerous it was for any nation to be in a dominating position in this respect.

Mr. Carr then passed on to deal with Insulin. He added little to what he said at the meeting of the Society of Chemical Industry in Liverpool (see THE CHEMICAL AGE, July 19, 1924, p. 61), but one or two points were brought out specially clearly. He first referred to the general nature of insulin as a substance capable of causing the removal of sugar from the blood. It was suspected to exist in the pancreas for many years, but it had proved difficult to obtain until the brilliant researches of Dr. Banting of Toronto showed the way. It next became the duty of the industrial chemist to perfect this process on a large scale so that diabetic patients could all have the use of the remedy. That this was done successfully was shown by the fact that in some 18 months the cost of treatment for the patient was reduced from about three guineas a week to 2s. to 3s.

Insulin when purified would probably turn out to be a chemical individual. It was apparently a protein-like substance, and was precipitable with the same reagents. The most remarkable fact was that at a certain degree of acidity (about PH 5·2) it was relatively insoluble. It was readily destroyed altogether by enzymes, and as it was found in close association in the pancreas with cells containing the enzyme, pancreatin, the first problem in its manufacture was to prevent its immediate destruction on grinding up the pancreas. This was done by cooling to a low temperature, rendering it insoluble by adjusting the acidity, and using a carefully regulated strength of alcohol for the extraction. The complex process of extractions and precipitations has already been referred to, and Mr. Carr did not dwell upon it, but he showed a number of slides of the actual plant used by the British Drug Houses.

Features of the Plant

One of the features of the plant is the way in which the various substances used are afterwards recovered. This is particularly noticeable in the case of the alcohol, which is used at several stages. The alcohol recovered after each stage is piped back to a central tank, after which it is brought up to the former strength in a still. There is thus no handling of the alcohol in cans or other vessels, and it is by this means that the plant is efficiently maintained.

Another difficulty that had to be overcome was that of reducing the bulk of the first extract with a minimum of heat, which might destroy the insulin. By passing the extract through the tubes of a Kestner evaporator at a fairly low temperature, in vacuo, the bulk is actually reduced to one-tenth.

The Chemist and the Fermentation Industries

The Streatfeild Memorial Lecture By Mr. Julian L. Baker

MR. JULIAN L. BAKER gave the seventh annual Streatfeild lecture at the Finsbury Technical College on Thursday, November 6. The subject was "The Chemist and the Fermentation Industries." Professor H. E. Armstrong, F.R.S., presided, and in stating the circumstances of the foundation of the Streatfeild lecture said that Streatfeild was one of the two assistants whom he had chosen in 1883 when the College was opened, and he remained there until his death in 1917.

Mr. Julian L. Baker said this was not an occasion to discuss in detail all the various problems connected with the manufacture of beer, sprits, and cider which urgently demand solution, but it might be educative to examine one of them to illustrate the conditions affecting scientific researches on technical operations. That example was brewing. At the present time the precise knowledge of what takes place in brewing was very little, and no real advance could be claimed since the time when the work of O'Sullivan and Brown and Morris on the changes which starch undergoes when acted on by amylase set the brewing world thinking some 40 years ago. At that time what happened in the mash tun appeared to be within reach of a solution, but unfortunately that did not turn out to be the case, and there were periods since of what might almost be termed inertia, so far as scientific investigation was concerned. Happily there now seemed to be indications of revived interest. For some years past a small band of chemists had been working at this fascinating subject. C. O'Sullivan started it in this country and he was followed by Brown, Morris, Ling, and Baker. Brown and Millar thought they had settled the constitution of starch in 1900.

The French workers, Masquemne and Roux, formulated the theory that starch granules consisted of 80 per cent. of amylose in varying stages of hydration, and that this was completely converted to maltose by amylase. The substance forming the external portion of the starch granules—the other 20 per cent.—was designated amylopectin and the properties which starch possesses of forming a viscous paste was ascribed to amylopectin. Ling had shown that this amylopectin is scarcely attacked by barley amylase which has been attacked by absolute alcohol, but if freshly prepared barley amylase is used, then the amylopectin is converted into α-amylodextrin which was first isolated by the lecturer himself in 1902. It was necessary to refer to this work as it brought out the important point that starch is not made up of a polymerised basal unit, and therefore that Pictet, Karrer and Irvine are probably in error in regarding starch as consisting of a single substance. Ling and his co-workers had recently elaborated the amylose-amylopectin idea and from it had enunciated views on the molecular structure of starch.

It thus appeared hopeful that in the near future we may be in possession of reliable information concerning one constituent of the barley corn, but starch is only one. There was nitrogen and the many changes the different proteins of the barley undergo during malting and mashing which required investigation. Little was known concerning the constituents of the raw materials used by brewers and of the changes which occur during brewing operations, and under such conditions it was not surprising that brewing was still regarded as a craft and the brewer as an empiricist.

The Need for Research

A solution of some of these problems could only be gained by efficiently organised research and at the moment there appeared to be indications that the industry was at last realising this fact. For the past four years the Institute of Brewing scheme, which has for its object the prosecution of researches on brewing materials and problems, had been in operation. It was financed in a very modest manner by a few breweries, but it was hoped that assistance of a more material character would be forthcoming in the near future.

Mr. Baker said that whilst investigations on barley and hops constitute the major portion of the general scheme of the Institute, other questions are receiving attention. Already many breweries were supporting the research scheme.

Much of the work was being carried out in research stations such as Rothamsted, Wye, and East Malling under the direction of Sir John Russell, and Mr. Salmon, assisted by committees of experts. Professor Pyman and Dr. Walker, of the Municipal School of Technology, Manchester, were responsible for the chemical work on the constitution of hops; Professor Schryver, of the Imperial College of Science and Technology, was investigating certain problems connected with yeast, and Mr. Hagues had commenced work at Tetley's Brewery, Leeds, on hydrogen-ion concentration. Results of interest had already been published on barley, malt and hops, and Professor Ling, of Birmingham University, had devised a process for the estimation of starch in cereals. The present heads of firms were beginning to see the necessity for brewers well trained in science and engineering, and the time was not far distant when the services of chemists would be in greater demand in breweries than at present.

The Manufacture of Alcohol

The problems connected with the manufacture of alcohol were, in some respects, similar to those of brewing, although not so complex. It was a statutory requirement that the specific gravity of a distiller's wort before fermentation should be ascertained by means of the saccharometer and this was impracticable with the amylo process of fermentation, which was based on the fact that certain moulds can secrete both amylase and fermentation enzymes. The advantages claimed for this interesting process, which is used on a large scale in Belgium, France, Italy, etc., were a better yield of alcohol, a purer product and economy of malt, compared with the ordinary method. Since the conditions exclude bacterial contamination, there are no bacterial side-fermentations and the spirit contains fewer impurities—less foreshots and tailings and less fusel oil. As in no stage of the procedure with this amylo process of fermentation can the specific gravity of the wort be taken before fermentation, the process cannot, for statutory reasons, be used in this country. It was greatly to be deplored that our Customs and Excise regulations prevent advantage being taken of any benefits which the process may offer.

The Amylo Process

Describing the amylo process, Mr. Baker said that a mash of a specific gravity of 1060 is prepared by steaming under pressure in a cooker such starch containing materials as maize, rice, potatoes, etc. The mash is transferred to a closed fermenting vessel, an outlet at the bottom being provided for the fermented mash. At the top there is an inlet for the steamed mash and suitable arrangements are also fitted for the entry of aseptic air, and a vent for the escape of CO_2 and air. The hot mash is injected by air pressure into the fomenting vessel and cooled, filtered air being passed through meanwhile. When the temperature has dropped to 40 deg. C. an active culture of the mould is added. The mould develops rapidly, the mash being permeated by the growing mycelium. In about 20 to 24 hours the conversion of starch into sugar begins, and when this is well started the requisite quantity of yeast is added and a vigorous fermentation starts in 24 hours. In the later stage the two processes of saccharification and fermentation go on side by side, the mould finishing the transformation of the starch into sugar and the yeast converting the sugar into alcohol. About four days are required for saccharification and fermentation. This combined property of saccharification and fermentation does away with the necessity for the use of malt in obtaining alcohol from starchy materials.

Commenting on the wonderful organism, S. Cerevisiæ, Mr. Baker referred to attempts to increase the proportion of glycerol in the fermentation of sugar solutions, the occurrence of some 3 per cent. of glycerol and succinic acid being called attention to by Pasteur as far back as 1858. This matter, he said, was a striking example of the influence of environment on the chemical products of the activity of a cell and was suggestive of a vast amount of inquiry as to what organisms other than yeast might do under varying conditions. During the recent war an increase in the quantity of glycerol to 10 per cent. was obtained by the Germans by a fermentation process and it was found that fermentation in acid solutions

proceeded in a very different manner from that obtaining in alkaline solutions. Ultimately sodium sulphite was used and the yield of glycerol was forced up to 23 per cent. and, later, by greatly increasing the sodium sulphite, to 36 per cent. of glycerol. The American War Office initiated an investigation on the subject and the German process was improved by substituting sodium carbonate for the sulphite and employing a yeast which had been acclimatised to the alkali. From 20 to 25 per cent. of the sugar was converted into glycerol, the other products of fermentation being carbonic acid and alcohol.

Possible Closing of the College

At the close of his lecture Mr. Baker referred to the possibility of the closing down of Finsbury Technical College, as the L.C.C. has decided not to continue its grants after July 31, 1926. It was urged that the matter be taken in hand at once by a committee of men of influence.

Following the delivery of the lecture, the Streatfeild Memorial Medal (presented by the City and Guilds Institute) was handed to Mr. Baker, together with a photograph of Streatfeild.

Mr. A. Chaston Chapman, in moving a vote of thanks, said that on the question of subsidising research he believed that the best research work was done by the individual. It was certain that the solid scientific foundation on which the fermentation industries were based had been laid solely as the result of work of that sort. He sometimes felt that our teaching centres attached too much importance to examinations, and too little to the turning out of sound and thoroughly well-trained practical chemists.

Professor G. T. Morgan seconded.

Professor Armstrong said that to him the occasion was a sad one, because he claimed to have been a founder of the College. When the College was started he was appointed to teach chemistry. He found the plans for the chemical laboratory already prepared, and had only to approve of them and the building would have been commenced. He considered, however, that they were worthless. It was no good merely to put up a chemical laboratory. The chemist of the future, he had said, must be something more than a mere chemist; he must have a thorough grip of the engineering side. The result was that very soon the College developed a system which was unique. In the beginning they had said they would have nothing to do with external examinations, and that was the practice at the College for many years; it was not subject to Degree worship, as other colleges were. Yet the men of Finsbury College had been more useful as chemists than any other chemists that had been produced in this country.

Mr. A. J. Chapman, president of the Old Students' Association, said the Council of the Association had appointed a committee who had gone into the question of cost to keep the College going. They could not attempt to find the capital sum of £250,000 necessary. The costs per man were being looked into. The scientific societies had been considered. The Institute of Chemistry and the Institution of Electrical Engineers were wholeheartedly in favour of doing everything possible to get the College going, and the Institution of Mechanical Engineers had a committee to see what could be done. Many of the City Guilds had also been approached, and the Armourers' Company were prepared to earmark the whole of their contribution to the City and Guilds in order to keep Finsbury afloat. As to the manufacturers, both the British Electrical and Allied Manufacturers' Association and Mr. Woolcock, the general manager of the Association of British Chemical Manufacturers, had promised to give all the support possible.

An Index of Technical Books

A FIRM of City booksellers, F. and E. Stoneham, Ltd., 79, Cheapside, London, E.C.2, has published a useful classified guide to the books relating to engineering, mechanical and chemical industries during the twelve months August, 1923, to Juy, 1924. This forms quite a useful little publication for filling, as the books are classified under both titles and authors, and particulars as to price and date of publication are also given. Copies of the guide will be sent free on application to the abov eaddress.

Society of Public Analysts

Catalytic Dehydrogenation of Alcohols

AT the ordinary meeting held at the Chemical Society's Rooms, Burlington House, on Wednesday, November 5 (Mr. G. Rudd Thompson, president, in the chair). Certificates were read for the first time in favour of Messrs. A. C. Barnes, B.Sc., F.I.C., J. J. Fox, D.Sc. (Lond.), F.I.C., T. C. Hay, and H. R. Jensen, M.Sc. (Liv.), A.I.C. Certificates were read for the second time in favour of Messrs. A. C. Brooks, A.R.C.Sc.I., A.I.C., W. Donovan, M.Sc. (New Zealand), A. G. Flower, B.Sc. (Lond.), C. Hollingsworth, F.I.C., G. M. Norman, B.Sc. (Lond.), A.R.C.S., F.I.C., C. E. Sage, F.I.C., P. F. Spendlove, B.Sc., A.R.C.S., A.I.C., C. W. Spiers, M.Sc. (Bristol), A.I.C., L. H. Trace, A.I.C., B.Sc. (Lond.), and J. R. Walmsley, A.M.S.T., F.I.C.

The following were elected members: Messrs. J. E. Nyrop, Cand. Polyt. (Copenhagen University), and C. P. Thorpe, B.Sc. (Manch.).

Abstracts of Papers

In the paper "On Certain New Methods for the Estimatioe of Small Quantities of Arsenic and Its Occurrence in Urinn and in Fish," Dr. H. E. Cox, M.Sc., F.I.C., pointed out that the methods and results of the Swedish Commission on chronic arsenical poisoning had been carefully tested and the conclusion reached that the nitric and sulphuric acid digestion process described by Bang and Ramberg gave higher and more accurate results than the older wet combustion method adopted by the Joint Committee of the Society of Public Analysts and the Society of Chemical Industry in 1902. The iodine titration method of Bang was not reliable, but Ramberg's bromate method gave satisfactory results if the amount of arsenious oxide to be estimated was not less than 0·01 mgrm.; below this amount the Marsh-Berzelius process following Ramberg's method of destruction was preferable. Large excretion of arsenic was due to the eating of fish, and it was shown that fish, especially plaice, might contain arsenic up to 3 parts per million. The eating of such fish led to the appearance of quantities of arsenic in urine within twenty-four hours.

Dr. A. T. Etheridge, B.Sc., F.I.C., in a paper on "Estimation of Cadmium in Brass," showed that the preliminary electrolytic separation of copper and lead was effected as described by the author (*Analyst*, 1924, 49,371). The liquid containing cadmium, zinc, and other metals was treated with sulphuretted hydrogen in acid solution, sulphides were taken up, precipitated next in alkaline solution, and again treated as before in both acid and alkaline solution, and a final acid precipitation then left pure cadmium sulphide which was weighed after conversion into sulphate. Though the method was tedious, the purity of the product was ensured with great accuracy within 0·05 per cent. cadmium in brass.

"The 'Hoyberg' Method of Cream and Milk Testing" was described by Messrs. N. C. Wright, B.A., and J. Golding, D.S.O., F.I.C. The "Hoyberg" method for determination of fat in milk and cream, it was stated, had been tested under carefully controlled conditions against gravimetric estimations. For milk testing the method had been found to give low and variable results, and to be unreliable for routine estimations, particularly in the hands of unskilled workers, for whose use it was chiefly designed. For cream testing the results showed a greater degree of accuracy, the errors being chiefly due to the fact that the cream was measured by volume and not by weight.

In a paper on "An Apparatus for the Catalytic Dehydrogenation of Alcohols," by Dr. Stanley G. Willimott, B.Sc., the usual laboratory methods for the preparation of aliphatic aldehydes were shown to be unsatisfactory. An improved dehydrogenation apparatus was described, the chief advantages being:—(*a*) The quantity of alcohol vapour entering the dehydrogenation tube is controlled by regulation of the boiling. The vapour passes through a heated copper spiral, and entering the tube at 300° C. is readily dehydrogenated by the copper catalyst. (*b*) The introduction of the preheater prevents liquid entering the tube with consequent cracking. (*c*) Heating of the air-bath is facilitated by employing an ordinary combustion furnace; asbestos sheeting maintains the temperature uniform.

Chemical Research and Medical Practice

Sir William Willcox at Manchester

A JOINT meeting of the Manchester Sections of the Society of Chemical Industry, the Society of Dyers and Colourists, the Institute of Chemistry, and the Manchester Literary and Philosophical Society was held at the Textile Institute on Friday, November 7. Professor G. G. Henderson, president of the Institute of Chemistry, presided.

A paper on "The Influence of Chemical Research on Medicine and Forensic Medicine" was read by Sir William Willcox, M.D. Sir William said that chemistry to-day might rightly be described as an exact science. It was only during the last 150 years that it had become so, and it was well to remember what a debt chemistry owed to physics for its present permanent position among the exact sciences. Medicine had been closely linked with chemistry from early times, and each, in the earlier times, has owed much to the other. Medicine might be described as an applied science. Many of its problems had been too difficult for solution beyond possibility of dispute, and theories and speculation still occupied a prominent position in the medicine of to-day. By researches in chemistry and the ancillary services many of the problems in medicine were being elucidated, so that as time advanced theories and speculations were being gradually displaced by deductions based on exact scientific observations.

Stages in the Development of Chemistry

Sir William then outlined the historical development of chemistry. First, there was the pre-historic period which dated from pre-historic times to 1500 B.C. The next period was the alchemical period of 1500 B.C. to 1560 A.D. It was during this period that scientific workers attempted the transmutation of metals and the conversion of the baser metals into gold, and that the ancient Indian and Greek philosophers conceived their idea of atoms, a conception which was later elaborated to form the basis of the atomic theory enunciated by Dalton. During this alchemic period chemistry appeared to have had little relationship with therapeutic medicine, but its association with toxicology was very close. Poisoning and antidotes appeared to have exerted a great fascination on the human race from earliest times. Toxicology did not really make any very great advance until the development of modern chemistry and the application of accurate analytical methods.

The third period was the Iatro-chemical period, 1500 A.D., by which efforts were mainly directed towards a cure for all ills—i.e., *elixir vitæ*. Phosphorus was discovered, and there were improvements in many processes, such as the making and staining of glass and earthenware. This period is of value to medicine in the discovery of sodium sulphate by Glauber, who extolled the virtue of his salt. It is still popular at the present day.

Then came the fourth, or Phlogiston, period from 1660 A.D. to 1775 A.D. This period marked the effort of scientific workers to endeavour to explain the changes occurring in combustion and chemical combination. Though much of this work was unfertile, it proved to be the precursor of the next, or Quantitative, period, in which the foundation of modern chemistry was well and truly laid, 1775 A.D. to the present time. By the development of the Marsh test for arsenic it was shown that in certain cases of arsenical poisoning arsenic could be detected in the liver, spleen, heart and muscles, and it was demonstrated that analysis should be directed not only to the stomach and the intestines but also to the other organs of the body. The importance of the absorption of poisons and the realisation that it is the absorbed poison which causes the death in most instances was thereby appreciated. In 1844 Fresenius and Van den Berg devised a method for the systematic research of all poisons, and for the destruction of organic matter—viscera—as a preliminary to analysis. In 1850 a process was discovered by which alkaloidal poisons could be extracted from viscera.

Work of Liebig and Pasteur

Coming to modern developments of chemistry, Liebig, who might be regarded as the founder of organic chemistry, elaborated the methods of ultimate organic analysis by combustion, and applied his knowledge to the developments of physiology and agricultural chemistry. Liebig's work was the foundation of the chemistry of proteins and metabolism. Pasteur was a chemist who had perhaps the greatest outlook on science of anyone in history, and was indeed claimed as the founder of modern medicine, though he had no special medical qualification. Pasteur's research work on fermentation led him on to the study of bacteriology. He demonstrated conclusively the germ theory, and showed, in a famous lecture at the Sorbonne in 1864, that the theory of abiogenesis, or spontaneous generation, was untenable. He demonstrated that the growth of organisms in sterile culture-media only occurred after the media had been inoculated with living organisms.

This work of Pasteur led to the study of wound infection by Lord Lister and the birth of antiseptic, and, later, aseptic, surgery resulted. By the researches of Pasteur and Lord Lister wounds and surgical operations were delivered of the dread of infection by the organisms causing pyæmia, septicæmia, erysipelas, hospital gangrene, tetanus, etc. Pasteur went on from the determination of the cause of disease to discover methods of immunity. In 1881 he gave a successful public demonstration in France of his immunising methods in regard to the deadly disease of anthrax by an experiment with sheep which was brilliantly successful. He discovered a means of immunising animals already infected with rabies by the injection of emulsions of the attenuated spinal cord of infected animals. This method was still in use in all parts of the world. The discovery is all the more remarkable when it is borne in mind that the organism causing rabies has not even yet been isolated.

Emil Fischer's Contribution

Emil Fischer was a chemist to whom modern medicine and physiology also owed a debt of gratitude. His work on the proteins led to an understanding of the protein molecule and the methods by which the metabolic processes in the body brought about its synthesis. His discovery of phenyl hydrazine led him on to the discovery of sugars and to the foundation of a more precise knowledge of carbohydrate metabolism and diabetes. He discovered veronal and a host of other new drugs whereby toxicology was greatly advanced.

Paul Ehrlich, another great chemist, by his chemical studies and their application to medicine has been one of the greatest benefactors of modern times. His experiments on dyes and tissue-staining led to the discovery of the tri-acid stain, whereby our knowledge of histology was much advanced. He discovered also the fuchsin stain for tubercle bacilli in 1882. His name will always be associated with the discovery of salvarsan and the allied arseno-benzol derivatives which have been of incalculable value in the treatment of syphilis, relapsing fever, etc. By his study of the blood corpuscles, consequent upon the perfection of his staining method, he became the founder of hæmatology.

The process of digestion, the processes whereby renal and skin excretions are effected, and the processes of metabolism owed their elucidation to modern chemistry. The phenomena of internal secretions, which form such a fascinating study, were essentially chemical processes and offer a very wide and fertile field for further research. One of the most interesting discoveries of recent times was the isolation of the active principle of the internal secretion of the suprarenal glands—i.e., adrenalin. Its chemical and physical properties have been accurately determined, and its physiological action is quantitatively known. It is interesting to note that adrenalin has been artificially synthesised.

Some Classic Criminal Cases

In dealing with forensic medicine, Sir William referred to the "Dr." Palmer case of strychnine poisoning at Rugeley in 1855. At that time the test for strychnine was not known, and the expert for the Crown was unable to say that strychnine was present in the body of the victim. From the clinical evidence it seemed pretty clear that the victim died from strychnine, but if similar evidence was presented to a Court to-day "Dr." Palmer ought to be acquitted. There was only one proof for poisoning and that was to find poison in the body.

The " Crippen " case was also mentioned. Crippen administered hyoscin to his victim. Hyoscin is a very decomposable alkaloid, and, normally, could not be detected in the body after a few days or weeks. Crippen, however, buried the viscera of his victim in quicklime, which acted as an antiseptic, and thus helped to preserve both them and the hyoscin.

The Marsh-Berzelius electrolytic test for the detection of arsenic had proved of considerable value, and was first applied by the lecturer in the " Sutton " case in 1911. He estimated the arsenic in the intestines and the liver by precipitating the sulphuretted hydrogen and weighing the arsenic sulphide. One substance he would like to see abolished from pharmacology was veronal. He had published a method for its detection in 1912 which had proved of service.

Chemical Engineering at Battersea

Laboratories and Courses at the Battersea Polytechnic

On Wednesday there was a " press view " of the buildings and laboratories at Battersea Polytechnic, London, S.W. So far as the chemical work here is concerned, this forms one of the principal subjects taught. The principal of the Polytechnic is himself a chemist—Dr. R. H. Pickard, F.I.C. The institution caters for day and evening students, the latter showing the greater number. A feature of the evening classes is the instruction given in industrial processes—chemical engineering and paper making for example, for which the buildings are well equipped. Another subject in which lectures will be given after Christmas is paint and varnish manufacture. This course will be given by Mr. A. A. Drummond, M.Sc., and will deal especially with the application of the colloidal aspects of the subject to industrial practice. Another course of lectures is being given on the Chemistry of the Proteins, which is the only one of its kind in London.

A considerable amount of research is carried out, some of the students holding grants from the Department of Scientific and Industrial Research. A number of students have recently been taking the Ph.D. degree in London University and some are continuing at the Polytechnic for post-doctorate research. The research covers organic and physical chemistry on conventional lines, quite a number of the results having been read as papers before the Chemical Society.

Other subjects of interest included bacteriology for the Institute of Chemistry examinations, and courses for women in the chemistry of domestic processes.

Chemical Engineering Equipment

The chemical engineering department is well-equipped with small-scale plant, capable of making chemical substances in quantities of several pounds at a time. In this way, although the processes are not carried out on the full industrial scale, students can familiarise themselves with the types of plant and methods of working used in chemical works. The principal units available are :—a vacuum pump, a vacuum evaporator and a vacuum drier with steam heated shelves, a steam heated nitrating pan with agitator, a centrifuge, filter presses, an oil-heated still with agitator for dry distillations, a ball mill and a set of tubes for studying heat transmission problems. The plant includes an air compressor for moving liquids from one place to another. By the use of these units it will be seen that practically any reaction can be studied on a semi-industrial scale, so that the equipment of the Battersea Polytechnic is of a very high order in its chemistry departments.

In the chemical engineering department there is also a small paper making plant which has been used at times for research purposes.

Royal Society Awards

The King has approved of the following awards this year by the President and Council of the Royal Society :—

A Royal Medal to Sir Dugald Clerk, F.R.S., for his application of scientific principles to engineering problems, particularly to the development of the internal combustion engine ; and

A Royal Medal to Dr. H. H. Dale, F.R.S., for his researches in pharmacology and physiology.

The following awards have also been made :—

The Rumford Medal to Mr. C. V. Voys, F.R.S., for his invention of the gas calorimeter ;

The Davy Medal to Professor A. G. Perkin, F.R.S., for his researches on the structure of natural colouring matters.

Ramsay Memorial Laboratory

Opening by Prince Arthur of Connaught

The new Chemical Engineering Laboratory at University College, London, which is a memorial to the late Sir William Ramsay, was formally opened on Wednesday by Prince Arthur of Connaught, who is President of the University College Equipment and Endowment Fund Committee. Sir Robert Robertson, Chairman of the Chemical Engineering Sub-Committee, presided at the ceremony. He said there was a want in this country of men with the technical training of chemists who were capable of transferring a laboratory operation to a large scale. Dealing with the details of training, he referred to a practice existing in the United States of taking students to works, and urged chemical manufacturers in this country to consider whether they could not afford similar facilities.

Prince Arthur of Connaught, in declaring the laboratory open, said that ceremony was the final act in this provision of a worthy memorial to that great man of science, Sir William Ramsay. The memorial had taken two main forms :—(1) The foundation of Ramsay Memorial Fellowships in Chemical Science, and (2) the foundation of a Ramsay Laboratory of Chemical Engineering.

Professor E. C. Williams, of the Universities of Manchester and Leeds, was appointed a year ago to the Ramsay Chair of Chemical Engineering, and it was under his guidance that the laboratories had been reconstructed and equipped. The beginning of work had not been actually deferred until that day, but for some time had been actively in progress. He was gratified to learn that, apart from the support given to the movement by the Ramsay Memorial Fund, which handed over a sum of £26,979, the Laboratory of Chemical Engineering had enlisted the ready and generous support of many of the great firms of this country which were connected with the chemical industry. A sum of approximately £1,390 a year for five years had been provided in this way. Even now further financial support was needed if the department was to be enabled to rise to its full possibilities as the handmaid of the chemical industry of this country.

Training of the Chemical Engineer

Mr. W. J. U. Woolcock, President of the Society of Chemical Industry, said the laboratory was the first laboratory in this country for the training of a type of man which must be produced. A chemical engineer should be a man essentially able to plan plant, and he was glad to observe that this laboratory was being organised with the view of teaching men to design plant. Referring to the admission of American students to do work in factories, he said that he believed there were certain difficulties in this country at present, but be believed the time would come when that step would not be too big to take.

Professor E. C. Williams, after referring to possible difficulties that might arise from the use of the term " Chemical Engineer," who might be considered by some to be a kind of superior plumber, went on to outline the kind of training men would receive in the new laboratory. They would be encouraged to develop a process from the test-tube scale to the industrial scale. They would design their own apparatus, and they would have to consider every aspect of expense and every energy change. Practical processes must take account of all the energy used and aim at the utmost economy. To achieve these results the students would be given ample steam, electricity and water, but otherwise they would have to achieve the practical solution of actual problems. A man who had done that successfully once could safely go out into industry as a chemical engineer.

A vote of thanks to His Royal Highness was moved by Viscount Chelmsford and seconded by Mr. Roscoe Brunner, who represented the chemical manufacturers of the industry.

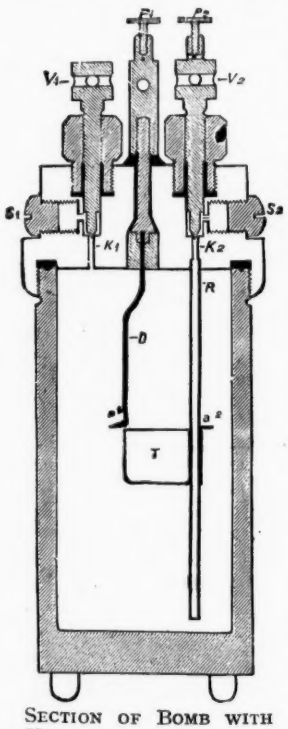
After the ceremony the laboratory was thrown open to inspection. In its temporary premises there are provided chemical laboratories, a drawing office, a mechanics' shop and the industrial laboratory, the last named being already well equipped with various plant units.

Smoke Abatement Exhibition

The Problem of Securing Efffciency in Boiler Plant

A SMOKE Abatement Exhibition opened in Manchester last week, and has remained open during the present week. That the question is one of great public importance is opportunely shown in a pamphlet issued by Dr. H. Osborne, the Medical Officer of Health in Salford, entitled ." The Problem of Atmospheric Pollution." There is a significant connection between the high smoke deposit and the high death-rate from respiratory diseases in this area. Statistics given in the booklet show an alarming increase in the death-rate from respiratory complaints during the past at periods when fogs occurred.

The greater part of the atmospheric deposit recorded is non-combustible inorganic matter, derived from the burning of raw coal, so that there is not a high proportion of the fuel lost through incomplete combustion. The most satisfactory solution would therefore appear to be either high or low temperature carbonisation resulting in smokeless fuel, gas, and by-products. Dr. Osborne states that the average person's preference for an open fire is sound on scientific grounds, and suggests that its replacement by a gas fire is not altogether desirable, because a large proportion of the ventilating effect is lost, and at the same time a larger quantity of dangerous gas is produced. He therefore advocates the use of one of the forms of smokeless fuel now being put on the market.



SECTION OF BOMB WITH KROEKER'S MODIFICATION SHOWING PLATINUM CRUCIBLE.

Be that as it may, economic reasons, as a rule, prevent universal adoption of these measures, in spite of their many advantages, which were incidentally well displayed at the Manchester exhibition. Where raw coal has to be used smoke may often be largely prevented by using well-designed mechanical stokers or pulverised fuel. If old-fashioned furnaces are in use and it is not possible to replace them, smoke production can be reduced and considerable economies effected at the same time by always using a coal suitable for the work. The importance of using the right kind of coal is also recognised by users of the more scientific methods of burning coal. To determine with certainty whether coal is of a suitable nature for its purpose or up to standard, it is necessary to make a few simple tests. It is first essential to know the calorific value of the fuel, and it is also desirable to determine other factors such as the percentages of moisture, ash, sulphur, volatile matter and fixed carbon.

The Value of Scientific Instruments

A ready means of determining the calorific value of coal is with the Darling calorimeter. This apparatus is easy to manipulate, and it can be obtained from dealers and manufacturers of scientific apparatus such as Gallenkamp's. If more accurate figures are required the Mahler-Kroeker bomb calorimeter yields results of the highest precision. Damp coal is particularly invidious as the evaporation of the water requires a considerable amount of heat. The percentage of water can be determined by straightforward heating tests, weighing before and after, so that suitable balances, crucibles and bunsen burners or electric ovens such as Gallenkamp's specialise in, should form part of the stock-in-trade of the intelligent coal user. These experiments can be made by any intelligent engineer, or better perhaps by a chemist. For determining sulphur, which is liable to exert a corrosive action, the same apparatus may be used, while for finding out the percentage of volatile matter a Davies crucible furnace is most suitable. If the percentage and nature of the coke, or fixed carbon is desired, a Lessing electric coking furnace should be used

Even when smoke is excluded by taking proper measures, it is well to check the efficiency of the boiler by analysing the flue gases, as about 15 per cent. of CO_2 should be present to ensure a minimum of waste. This may be done most simply by an Orsat apparatus, but more rapidly by various automatic CO_2 recorders on the market. It is also a useful indication of correct combustion if the temperature of the flue gases is watched, and for this purpose either a special resistance thermometer or a pyrometer has to be used, for which the resources of the scientific instrument maker must be drawn upon once more.

Advance in Dyers' Wages

Result of Official Arbitration

SIR WILLIAM MACKENZIE, in his award upon the matters in dispute between employers and employees in the bleaching, dyeing, calico printing, and finishing trades of Yorkshire, Lancashire, Cheshire, Derbyshire, and parts of Scotland, gives a comprehensive survey of the steps leading to the establishment of a minimum wage of 50s. 7d. per week for adult male workers.

Under his award all males 21 years of age and over are entitled to 2s. per week, or ½d. per hour for all hours worked, and one-eighth of a penny per hour extra for overtime. All females, 18 years of age and over, are entitled to 1s. 3d. per week, or five-sixteenths pence per hour, for all hours worked up to 48 hours. The change in the sliding scale operates for the full pay week preceding November 8, 1924, and the award of Sir William Mackenzie operates for the full pay week preceding November 15, 1924. The advances are applicable to some 80,000 operatives.

Both Sides of the Question

For three years, says Sir William, the industry has suffered through lack of business resulting in short work and reduced wages. Weekly returns in October averaged 41 hours' work only. Operatives complained that they did not thus receive the wages contemplated by the agreement in the industry of a full rate for a 48-hour week, plus a sliding scale wage in respect of the cost of living. They therefore claimed a 10 per cent. advance on the base rates of all day workers and various other alterations. The Union claimed that the industry was prospering and pointed to the large dividends being paid.

The employers submitted that the trade was depressed and uncertain. The relative value per unit compared with pre-war was not being obtained. This was partly due to short time, but it would have to be examined sooner or later, and rates and prices appropriately adjusted. The products of the allied trades were, in the main, exported, and, accordingly, had to meet competition in foreign markets. The high prices charged for the English products were thus a serious handicap. The employers tendered a large volume of evidence on this head. In European markets, the velvet and cord dyers had a hard struggle, and Japan was doing to a large extent its own velvets and was entering the China market. Italy and Barcelona were competing strongly in the South American market with coloured woollen goods. Italy, Belgium, Holland, and Germany were offering fierce competition in the various sections of the allied trades. There had been a considerable loss of trade by the increase of native dyeing in India, Japan, and other Eastern countries, and, in particular, Italy and Japan were taking away the former English trade.

In the section of calico printers, 20 per cent. of the printing machines were now idle, while others were on reduced hours, and the present production was only 65 per cent. of normal capacity.

Costs of Production

Sir William discusses the application that the agreement covering the cost of living percentage, which provides for different rates for piece-workers, should be abolished, and that all cost of living wages be paid at the percentage fixed for the day workers, and says the claim was not made out.

By Sir William's award adult males will now receive a total wage of 56s. 4d. per week. Had the full 10 per cent. been granted they would have been entitled to 59s. 9d.

Rubber Worker's Compensation Claim

Alleged Poisoning by Fumes

A CASE in which it was alleged that a man had been slowly poisoned for years by fumes from chemicals when making golf balls was heard in Bow County Court on Monday last, before Judge Hargreaves. The applicant under the Workmen's Compensation Act was Henry Chapman, of Stratford, London, and the respondents the India Rubber Gutta Percha and Telegraph Works Co., Ltd., of 106, Cannon Street, London, and Silvertown. The applicant claimed for total incapacity at 30s. a week.

Mr. O'Malley, for the applicant, said that Chapman had contracted an industrial disease, dermatitis, while making gutta percha dough for golf balls at the respondents' factory. At the end of 1923 workers were using a brown dough, but it was changed to a white, and in this mixture there were various chemicals and petrol, and the fumes given off by these had apparently affected the applicant and poisoned him. He gradually got worse, and in May complained of pain so intense that he thought he should lose his reason. He stayed away from May 23 to June 23, and then went back for five days on a different job, but found he could not stand the fumes. In August he was certified as fit for work. He applied, but the firm had nothing for him, owing to temporary slackness. On September 5 he was put on lifting boxes but found this too much for him. He had been at home ever since, suffering with nervous debility, stuttering, with occasional films across his eyes, all the result of this slow poisoning. Counsel did not think the Judge would have the smallest doubt that the dermatitis and the nervous debility from the dermatitis had been brought on by the long poisoning process to which the man had been exposed.

The Process Described

The applicant, giving evidence, said that this gutta percha dough was made in 180 degrees of heat. It was rolled between steel plates, and under this treatment would swell and then burst, and the fumes were thrown off direct into the worker's face. He was at this three or four afternoons a week. The white dough was a new experiment, and as they had found it successful its use was continued. The irritation on his hands he first noticed in the middle of February, and then the rash spread up his arms, his face and neck. The applicant said he stammered now but had never done so before. The effect of the fumes on him had been that all the front of his body seemed to have gone dead. He obtained a certificate from the certifying surgeon to the defendants, saying he was suffering from dermatitis in May.

Dr. McGregor Sharp said he examined the man on November 4 and found no sign then of skin affection, or dermatitis. His cerebral metal condition was obvious: it was very much impaired He considered his condition was due to his exposure to the fumes of chemicals and liquids, such as were usually associated with the making of gutta percha. He referred in particular to carbon bisulphide, benzine, benzole, carbon chloride, mercury, alcohol, various acids, resins, oils, etc. He could not, course, specifically say as to which of these had caused the trouble.

In cross-examination he was asked: "Is his condition consistent with his having inhaled poisonous fumes for a long time?" and replied, "It might be a long time or a short time, it could be one dose or repeated doses"

Mr Sandilands said that applicant's case must fail, as it had to be proved that he was suffering from dermatitis, whereas it was clearly shown in the medical evidence that he had recovered from it. Inhaling poisonous fumes from chemicals would not cause dermatitis, which was an irritation of the skin.

Dr. Garden later gave evidence, and said he attended Chapman all through the dermatitis, from which he had recovered on August 29. However, there was always a tendency for it to recur if he went back to his old work. Prolonged dermatitis would debilitate his condition, but he did not think the condition would be caused by inhaling poisonous chemical fumes.

Two other doctors agreed that they could not connect the debility with the dermatitis.

Mr. Sandilands, for the respondents, submitted that applicant's case must fail as there was no connection between the dermatitis—the accident—and his condition now.

In giving judgment Judge Hargreaves said there could be no doubt the applicant was at the present time incapacitated from any form of work. He had to decide it the man's condition was anything to do with the accident that was the original attack of dermatitis, or was it consistent with other causes. He had come to the conclusion that it was a direct result of this dermatitis. He should therefore enter an award in favour of the applicant for total incapacity for 30s. a week, from August 25th.

Enzymes and Leather Bating

Society of Chemical Industry: Nottingham Section

AT a meeting of the Nottingham Section of the Society of Chemical Industry, Mr. C. E. Pickard read a paper on "Observations on the Laboratory Testing of Enzyme Bates." The author outlined the standard methods for the measurement of proteolysis. He pointed out that there are many variable factors to be encountered and allowed for before a reliable relationship can be established between laboratory tests and practical bating. The more important general factors influencing the results of laboratory tests were summarised as follows:—(*a*) When the enzyme is in considerably smaller concentration than the substrate the velocity of reaction is in a direct linear proportion to the quantity of enzyme present; (*b*) As the quantity of substrate diminishes greater quantities of enzyme have relatively less effect; (*c*) the relative activity of different concentrations of an enzyme is quite different at different stages of the reaction. Hence when the quantity of substrate is small, the smaller concentrations of enzyme are relatively more active than the larger.

Effect of Adding Salts

In testing the activity of pancreation in a gelatine substrate the author found that the addition of ammonium chloride, ammonium sulphate or common salt to the enzyme could increase the activity to a value about three times that obtained under standard conditions in the absence of these salts. If sodium bicarbonate is mixed with the ammonium chloride the activity is further increased; boric acid does not increase the activity nearly so much, but if mixed with lime the resulting activity is about equal to that produced by ammonium chloride. Represented graphically, the curve of activation by ammonium chloride is of the same form as the ionic dissociation curve of this salt. Yet in the bating of goatskins, the use of large quantities of ammonium chloride delimer results in the too rapid falling of the skins, and the enzyme action is practically inhibited thereby. Disinfectants may or may not influence the activity of the enzyme. Certain salts of the alkaline earths, in addition to acting as "buffers," are able to produce sudden changes of enzyme activity by converting inactive zymogens into active enzymes. Different substrates may produce widely different results. Bile salts show no activation of trypsin in a gelatine substrate, but if a fatty casein is used as substrate the trypsin is better able to hydralyse the casein owing to the fat removing action of bile salts.

Little is known about the possible interactions which may occur between one enzyme and another, and distinction between similar enzymes is often impossible.

Any method for testing bates must be preceded by (*a*) a complete qualitative analysis for bodies of physiological interest; (*b*) a complete qualitative analysis for organic and inorganic substances, and (*c*) a careful consideration of the influences of the results on subsequent work. Only after this preliminary work has been completed can a decision be made as to the best method to be employed for the quantitative estimation. The single method can be postulated as the best. The bate solution should seldom exceed 1 per cent., and the bate should be allowed to act on at least two hundred times its dry weight of substrate.

The author was of the opinion that laboratory methods could not possibly indicate those important refinements of bating, in which were included the soft, silky grain and those ideal qualities of "feel" which characterise a correctly bated skin. Laboratory methods are based on accidents of solubility, amphoterism and physical properties of materials which were attacked by trypsin; the criterion of bating was not fully understood, but tryptic action alone could not produce efficient bating. The author concluded that laboratory methods correctly carried out and interpreted, provided working information of value, the results as criteria of relative bating efficiencies must be accepted with considerable reserve.

The Chemical Expert in the Witness Box

Hints by Sir William Willcox

A JOINT meeting of the Manchester Sections of the Society of Chemical Industry, the Society of Dyers and Colourists, the Institute of Chemistry, and the Manchester Literary and Philosophical Society was held at the Textile Institute on Friday, November 7. Professor G. G. Henderson, president of the Institute of Chemistry, presided.

In the course of a paper on "The Influence of Chemical Research on Medicine and Forensic Medicine," Sir William Willcox gave an outline of what he conceived should be the mental outlook of the expert medical or chemical witness when giving evidence in courts of law or before Government Commissions, and other tribunals. The inquiries might, of course, be either of a criminal or of a civil nature; whichever they were the function of the scientific witness was the same. The giving of evidence by the scientific witness was one of the greatest privileges and honours which could fall to his lot. It was important to realise that the true function of the expert witness was to assist the court of inquiry by his expert knowledge and experience. He was not there to win the case for any particular side. He should not be an *ex parte* witness, and he should be absolutely free from bias. This was supremely essential in criminal cases, but it should be none the less important in a civil case.

A High Responsibility

The giving of scientific expert evidence was a responsibility which should not be lightly undertaken. Statements of fact, on which the inquiry was based, should be carefully considered and examined in a critical spirit. The scientific witness should refresh himself by the most careful study of the literature and scientific knowledge relating to the subject in question. If necessary, he should conduct scientific experiments and investigations to elucidate any difficulties which might arise. An example of this occurred in an exceedingly interesting case—the "Shampoo" case—which probably some of them remembered. Tetrachloride of carbon was at one time popular as a "shampoo" among ladies. Before he expressed any opinion upon the poisonous properties of carbon tetrachloride he did some experiments with rats, and very soon found that the vapour was exceedingly heavy. It could be poured from one vessel into another, and a few breaths of it might prove fatal.

The expert witness should turn and turn about in his mind the subject on which he was asked to give advice. He should unsparingly cross-examine himself on every aspect of the question. It was a great advantage if he could imagine himself to be in the position of judge or cross-examining counsel, and to try and view the subject of inquiry from their point of view as well as from the aspect of the counsel on whose side he was engaged. The success of an expert, as a witness, was much assisted by an appreciation of the psychological attitude of those who questioned him. This view of things would enable him to anticipate the questions which were going to be put to him, and would make him tolerant and charitable to the searching questions of the cross-examining counsel. Before being called upon to give evidence, the expert witness should express his opinion on the facts before him in a written report, and it was well that the reasons for the opinion should be concisely stated in the report. The opinions expressed in the report should be unalterable views on which the expert had no doubt whatever.

He must not mention any names, but in a recent case a certain expert was engaged. He had sent his report in, and before he should have gone into the witness box he told his counsel, "I am afraid I cannot quite come up to my report." It was a terrible position for counsel. Needless to say, that expert was not called upon to give evidence. Any expression of opinion on which there was any possibility of doubt should be omitted from the report. In giving evidence the witness should remember that it was his duty to help the court by answering questions put to him in a clear, concise, fearless, and audible manner. Many witnesses did not speak up in giving evidence. He was recently thanked by a reporter in a case, who said, "Well, at any rate we can hear what you say, no matter what it is." (Laughter.)

In Cross-Examination

In giving evidence-in-chief the answers should be brief and to the point. In cross-examination, also, the answers should be as concise and clear as possible. Long explanations and evasions of a direct answer were likely to create a bad impression. A direct negative or affirmative should be given where possible. If this was not possible, the reasons for the inability to give a direct answer should be clearly and curtly stated. Lengthy explanations and attempts to give lectures in the witness-box were apt to weaken the evidence and to raise points of which the cross-examining counsel would not fail to take advantage. (Laughter.) The duty of a witness, whether he was an expert witness or an ordinary witness, was to answer questions put to him by those intended to do so. He should avoid making any statements which were not answers to questions put to him. The expert witness should avoid giving any answers which were not absolutely free from ambiguity. Thus, for instance, if a question was a double or a triple one, the witness should ask for the question to be suitably divided so that separate answers might be given to each. The other day he was asked a question which was really three questions, and expected to give an answer. The counsel on the other side would have fitted the answer to the particular part of the question he desired to. He asked for the question to be separated, and answered the three questions separately with a "Yes" or "No." If quotations from books or reports were put to him, the expert witness would be wise to ask to see the work in question, and to give his explanation of the bearing which any written statement had on the inquiry. Generally, when one was confronted with a book some passage was picked out which seemed perhaps to tell against the evidence the expert witness was giving, whereas the whole book was supporting that evidence. It was similar with statistics and reports.

From a long experience as a forensic witness, he would like to express his very great appreciation of the courtesy and consideration which were invariably extended by members of the legal profession to those of his own. It was the duty and privilege of an expert witness to assist justice by his experience and advice. It was his duty, also, to ensure that his views were clearly put before the court, and not one jot or one tittle withheld or left in doubt.

Accidental Phosgene Poisoning in Dye Works

AN inquiry was held by the Manchester City Coroner, on Tuesday, into the death of John William Burke, aged 33, of Manchester, who was employed as a laboratory supervisor at the Blackley works of the British Dyestuffs Corporation, Ltd. Burke died on November 8, after returning home the previous day feeling unwell and complaining of having been gassed.

Evidence was given by Herbert Saunders, who stated that Burke was an experienced man. On the evening of November 6 witness gave him instructions for the carrying on of a process which had been begun and in which phosgene was employed. Witness examined the whole of the apparatus very carefully and found it to be in perfect working order before he went off duty. Burke was quite familiar with the apparatus used and was aware of the danger of phosgene. The following day he (Saunders) made an examination of the apparatus and found that it was still in working order except that the suction had been turned off. Witness stated that this, unless the cylinder containing the phosgene were also turned off, would mean that small quantities of the gas would be slowly liberated into the air. He expressed the opinion that when the process was completed the deceased had tried to turn off the supply of phosgene but was unable to do so. To exert greater force Burke had probably disconnected the cylinder and then for some unknown reason had turned off the suction, upon which the whole safety of the process depended. Witness again stated that Burke was fully qualified to deal with so dangerous a gas as phosgene. Medical evidence was given to the effect that death was due to cardiac failure following congestion of the lungs, and that the post-mortem examination showed that the conditions were compatible with the inhalation of gas.

A verdict of "accidental death" was returned, and the Coroner said that the chemist in charge, when he intended to leave someone else to look after the process, should make absolutely sure that all the taps and valves would turn off properly. He further suggested that it would be wise to ensure that a fan in the room was in proper working order and available as a second line of defence.

German Tar and Tar Products Industry

Increased Price of Raw Materials

THE Commercial Secretary at Cologne (Mr. C. J. Kavanagh) informs the Department of Overseas Trade that, according to the *Deutsche Bergwerks Zeitung* of October 29, business in tar products has notably revived since September. The cause lies, unfortunately, in the fact that the production of raw tar has considerably decreased, and consequently those tar distilleries which must buy the raw material are throwing themselves in large numbers upon those producers which are not bound by working-up contracts and are able to sell raw tar freely. The prices have been increased from 3.50 mks. per 100 kg. to 5.50 mks. and even 6 mks. and more. How it is possible to make a paying business in finished tar products with such prices is difficult to see, since the prices for finished products have not increased but rather fallen. Assuming the distillation costs to be at least one third of the raw tar price, it is difficult to calculate how the cheaper prices of the finished goods allow of a higher price of raw material.

In East, Central, and South Germany pitch stocks are completely sold out. In the Ruhr district there are still certain stocks, but the quantity, we are informed from a reliable source, will not influence the price development. In view of the large consumption of the briquette works during the last few weeks these amounts have considerably decreased and will probably be disposed of by the end of the year if the pit coal briquettes continue to be sold to the present extent by the Coal Syndicate.

The oil production is entirely absorbed by the consumers, so that there are only such stocks as have to be maintained in order to keep up a regular manufacture. In naphthalene in various qualities business is quiet. For anthracene, as used by the chemical industry for dyes, the demand is very brisk and even exceeds the amounts produced.

Soap-Making Progress in China

SOAP-MAKING is making great strides in China. The Yao-Hwa soap works in Nankin made in 1923 10,000 cases of soap for the home market.

Imported soaps have been almost entirely displaced in the Wuhan market by the local product, says the *British Soap Manufacturer*. Even common soap produced by the Chinese factories in Shanghai cannot compete with it. A chest of common soap produced by the local factories generally fetches a price ranging from Tls. 2·20 to Tls. 4·30, but a chest of Shanghai made Chinese soap is sold in the Wuhan cities for between Tls. 2·60 and Tls. 4·00.

Of toilet and fancy soap, the bulk imported into Hankow comes from Japan, Great Britain, France, and the United States, although a portion is supplied by Chinese factories in Hong Kong and Shanghai.

At present there are eight Chinese soap manufacturing companies in Wuchang and Hankow with a total capitalisation of over a million taels. The value of their total yearly output is estimated at over a million taels. All of them make common wash soap. Japanese manufacturers hold a predominant position on the Hankow market in toilet soap manufacture. There are 45 Japanese brands on sale. Of these 32 brands are made in Japan and the remainder turned out by Japanese-owned factories in Hankow and Shanghai. About ten brands of European and American made toilet soap are also seen on the Hankow market.

The Production of Gems

AT the last meeting of the University of Birmingham Chemical Society Mr. J. R. Dolphin, B.Sc., read a paper on "The Application of Science to the Production of Gems." After dealing with the properties of refraction, pleochroism, hardness and density, he showed that microscopical examination was necessary to distinguish between "synthetic" and real gems. Verneuil's method of producing colourless and coloured corundums was fully described. The colouring agents used in the production of the ruby, yellow and blue sapphires, "synthetic topaz" and "scientific alexandrite" were dealt with. The distinction between "imitation" pearls and the Japanese culture pearls was emphasised. The production of the two types was described and illustrated by means of specimens and lantern slides.

Scientific Utilisation of Refuse

DESCRIBING Birmingham's new salvage and utilisation works, a contributor to *The Times Trade and Engineering Supplement* refers to an interesting plant used for the reduction of trades and market refuse and large quantities of bone sorted from the house refuse. These raw materials are graded and prepared for the production of clarified fat, artificial manures and feeding-stuffs. The essential part of the plant consists of nine melters, in the form of cylindrical steam-jacketed vessels, working with steam at a pressure of 80 lb. per sq. in. A charge of raw material weighs 15 cwt., and requires about four hours to dry to 8 per cent. of moisture content. Fumes from the melters are extracted by fans supplying air blast to the furnaces, where they are dissociated and rendered odourless before passing to the chimney-stack. After leaving the melters the charge is transferred to centrifugal extractors, part of the clarified fat being utilised in the manufacture of soap for departmental use and the remainder sold. The dry residue is removed from the centrifugal machines through pipes by means of air blast, ground to a fine powder, and packed in bags by automatic apparatus of unique design.

Provision has been made for the storage of manures or feeding-stuffs not required for immediate sale, so as to enable the department to comply with seasonal demands, and to avoid any possible loss of revenue. Nothing is wasted, and the revenue from the sale of residual products has effected a very considerable reduction in the cost of a necessary public service.

Canada's Chemical Industry

ACCORDING to a preliminary estimate issued by the Dominion Bureau of Statistics the production of chemicals and allied products in Canadian factories last year reached a total value of more than $106,500,000. Exports of Canadian products in this class were valued at 15·7 million dollars, and imports amounted to 26·1 million dollars in the same period. More than 124 million dollars' capital was invested in the industry, and about 14,600 were employed. Salaries and wages paid totalled 17·8 million dollars, and the cost of materials used was about 52·9 million dollars. Increases were noted in the amount of capital employed, the number of employees, payments of salaries and wages, cost of materials and value of products, as well as in the value of imports and exports.

Nearly 82 per cent. of the chemical exports of 1923 went to the United States, United Kingdom, and Mexico in the order named; and nearly 13 per cent. was shipped to Newfoundland, Japan, British West Indies, Australia, and New Zealand. More than 98 per cent. of Canada's import business in chemical products was from seven countries, with the United States leading and the United Kingdom next, followed by Germany, France, the Netherlands, Belgium and Switzerland. The remaining 2 per cent. of chemical imports was drawn from more than a score of different countries.

Le Blanc's Influence on Soda Manufacture

PROFESSOR THOMAS S. PATTERSON, of the Chair of Organic Chemistry in the University of Glasgow, delivered a lecture on the work of the great French chemist of the Revolution period, Le Blanc, to the members of the Royal Philosophical Society of Glasgow, on November 5. Professor Patterson's subject was "Soda, Nicolas le Blanc and the French Revolution." He traced briefly the history of the development of soda manufacture from the earliest times, outlined Le Blanc's epoch-making contributions to the progress of the industry, and the assistance which in the critical days of the Revolution, when France found herself cut off from the world's chief sources of soda supply, he rendered to his country by the production of large quantities of that important article. Le Blanc, in return for the valuable work based on his researches and discoveries, was badly treated by the authorities and, after struggling against misfortune for some years, he died miserably by his own hand. The lecture was illustrated by a series of lantern slides of portraits of a number of leading French chemists and of personalities of the Revolution.

Recent Wills

Mr. John Allen, of Oak Hall, Mardon Ash, Ongar, Essex £15,389
Mr. Charles Lorleberg, of 35, Gloucester Gardens, London, W., a director of R. W. Greeff & Co., Ltd. £8,069

From Week to Week

No less than 107 concerns are now manufacturing textiles in Bulgaria.

An oil spring, discharging 1,000 litres an hour, has been discovered at Gabian, near Montpellier, France.

Mr. John M. Mullaly has been elected to a war memorial studentship in chemistry at Balliol College, Oxford.

A loan of £56,500 is proposed by Camborne Urban District Council for sewerage and sewage disposal works.

Tanning extracts produced in Jugo-Slavia last year amounted to 10,620 metric tons. Exports to Great Britain totalled 1,420 tons.

Deposits of potash have been discovered in Denmark, near Trondhjem, and experimental mining has provided an analysis showing 14 per cent. of potash.

Mr. R. Hellon, Ph.D., who has died at Seascale, Cumberland, was public analyst for Cumberland and Westmorland for 35 years and a leather trades' chemist during the war.

The death is announced at Liverpool of Mr. Thomas Cosier, for many years manager of the Lancashire metal works of the United Alkali Company. He retired in 1914.

Professor H. H. Dixon, F.R.S., has intimated that for private reasons he is unable to accept the appointment to the Regius Chair of Botany at Glasgow University recently announced.

An article on "Glassmaking Processes" by Mr. T. C. Mitchell, B.Sc., research assistant at the Royal Technical College, Glasgow, appeared in the *Glasgow Herald* on November 7.

Professor J. W. Hinchley, who took a leading part in the formation of the Institution of Chemical Engineers, of which body he is now the Honorary Secretary, recently underwent an operation for appendicitis, and we learn that he is making satisfactory progress.

Mrs. Tyndall, widow of Professor John Tyndall, F.R.S., has made a donation of £500 to the Royal Society to be used at the discretion of the Tyndall Mining Bequest Committee, to meet the out-of-pocket expenses of the Tyndall Research student during his investigations.

Mr. H. W. Gepp, general manager of the Electrolytic Zinc Corporation of Australasia, President of the Australasian Institute of Mining and Metallurgy, and one of the Australian delegates to Wembley, delivered an address to the University of Birmingham Metallurgical Society on Monday.

"The greatest oil combine in the world" forms the subject of numerous newspaper reports. It is said to be likely to take effect shortly, and will involve the merging of the Anglo-Persian, Burma and Royal Dutch Shell Companies. The control of the new enterprise would extend to Venezuela, Peru, Dutch Indies, India, Egypt, Roumania, Mosul and Trinidad.

At Birmingham University the following appointments have been made for the session 1924–25:—Mr. A. R. Bowen to be research worker in the Department of Oil Mining. Mr. S. H. Edgar and Mr. A. Binns to be teaching scholars in the Departments of Chemistry and Electrical Engineering respectively: Mr. A. W. Paynton to be student demonstrator in the Department of Bio-Chemistry of Fermentation.

"Technique must extend beyond the laws of ventilation, a knowledge of the Mines Act and of physics," said Mr. Hodges to mining students at Nuneaton. "It will have to enter into the realm of chemistry in a very definite way. The modern tendency is to cease to regard raw coal as an end in itself, and the colliery manager will have to have some knowledge of the chemical processes through which coal passes before it enters into a final consumption as power."

An official report from Belgium states that the coal market is still very depressed, and business in the coke market is weak. The home demand for coal tar is satisfactory and the export demand very large. Germany is purchasing from Belgium, and British buyers are also purchasing on a large scale, as they are anxious to regain the lead in the market and increase prices. Benzol is still inclined to rise, and the demand is great. Sellers are overwhelmed, and there are no available stocks.

The death is recorded of Mr. E. Foy, manager of Cook's Explosive Works, Penrhyndeudraeth, at the age of 47.

A German report states that large artificial silk producers are considering affiliation with the German Dye Cartel.

Dr. G. S. Robertson has been appointed Professor of Agricultural Chemistry at Queen's University, Belfast.

The Chilean Minister of Finance is framing measures to improve the propaganda organisation for Chilean nitrate.

A modern silo for oil seeds at Marseilles is proposed under a Government scheme. The estimated cost is 7,500,000 f.

The leading German dye makers are said to deny all knowledge of the rumoured negotiations for the establishment of a large combine in place of the I.G.

Applications are invited for the professorship in biochemistry and the lectureship in bacteriology at Queen's University, Belfast. Particulars may be obtained from the secretary.

"The suggestion that artificial silks will, at any time, displace cotton, or even become a serious competitor, is absurd," said Mr. W. Wilkinson, head of the Blackburn Textile College at Blackburn.

Mr. R. W. M. Thomson, B.Sc., assistant lecturer in Physical Chemistry at King's College, London, has died at the age of 25. He was a science medallist at Dundee High School and completed his studies at St. Andrews.

Dr. A. W. Crossley, D.Sc., F.R.S., director of research, British Cotton Industry Research Association, has been appointed a member of the committee of inquiry into the existing statutory regulations governing the use of artificial humidity in cotton cloth factories.

A strong flow of oil, containing a good proportion of crude petrol has been struck by engineers near Pau in the Basses-Pyrenees. Its density has been found to be 0·84, and the Director of Mines has gone to survey the discovery, which appears to be the most important of its kind in France.

By an Order of Privy Council, dated October 30, Professor E. P. Cathcart, M.D., D.Sc., F.R.S., Professor of Chemical Physiology in the University of Glasgow, has been appointed to the vacancy in the membership of the Medical Research Council caused by the retirement of Professor D. Noël Paton, M.D., F.R.S.

A brief has been filed with the United States Court of Appeals by the Chemical Foundation, defending the validity of the purchase from the Government of 6,000 German dye and chemical patents. The Government seeks to have the patents returned on the ground that they are worth millions of dollars and that the $270,000 paid for them by the Foundation is inadequate.

The Royal Scottish Society of Arts has awarded a Keith Prize, value £20, to Mr. Robert Maclaurin for his paper on "The Carbonisation of Coal for Smokeless Fuel and Industrial Gas," and the Council of the Society recommends the award of a grant of £85 to Mr. C. Norman Kemp and colleagues towards the cost of additional apparatus required for the continuance of their technical X-ray research on fuels.

The managing director of a concern using trichlorethylene as a solvent in a secret process for combining leather and rubber, who was charged with being drunk in charge of a motor-car on Friday, November 7, successfully pleaded that he was suffering from the effects of trichlorethylene vapours inhaled in the works. He admitted having taken brandy to counteract the effects, and he was fined on the count of driving dangerously only.

Mr. J. Turney Wood, a director of Turney Bros., Ltd., leather dressers, of Nottingham, died on November 9. Mr. Wood, who was 59, had been for 30 years actively associated with the scientific side of leather production. He had an international reputation as a leather trade chemist, and had written a number of books on the subject. He was a Fellow of the Institute of Chemistry, Chairman of the Leather Research Association, Vice-Chairman of the Sheepskin Federation, member of the executive of the United Tanners' Federation, a member of the committee of the Society of Chemical Industry (Northern Section), the Society of Leather Trade Chemists, the American Chemical Society, and the American Leather Chemists' Association. The funeral took place at Nottingham on November 13.

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Patent Literature

Abstracts of Complete Specifications

222,602. Emulsive and Detersive Agents, Manufacture of. W. E. Billinghame, 2, Marvels Terrace, Grosvenor Park, Lee, Kent. Application date, Nov. 19, 1923.

A commercially pure protein containing not less than 80 per cent. of pure protein is saturated with several times its weight of water, and then treated with caustic soda or potash at a temperature below 140° F. so as to dissociate the protein without appreciably saponifying the amido fatty acids. In the product the COOH and the KOH or NaOH groups co-exist but are not in combination. The quantity of caustic alkali used may be 50 to 100 per cent., reckoned on the weight of pure protein. The reaction is complete in about one hour. Examples are given of the use of blood albumen or casein to obtain these products. The resulting liquid emulsive agent may be used as an ingredient in soap in the proportion of 10 per cent. to harden the soap and improve its cleansing properties. It may also be used for emulsifying oils, fats, wood tars, bitumen, bituminous materials or compounds, either natural or artificial. An emulsion of oil or fat in water is obtained by dissolving 1 to 5 per cent. of the emulsifying agent in water, and then pouring the oil or melted fat into the mixture continuously while stirring. When treating soap, the emulsive agent is poured into the hot solution. When treating bituminous material, the material is melted at 220° to 230° F., and 1 to 10 per cent. of the emulsive agent is added during agitation. The necessary quantity of water to make the required volume of emulsion is then added. These aqueous bituminous emulsions may be used as a binding medium in the making of roads, and the manufacture of briquettes of carbonaceous material such as coal, coke, lignite, peat, etc.; also as a preservative for treating metals, stone, wood, felt, etc.

222,922. Metal Catalysts, Apparatus for Making. R. W. Barker, London. From Vegetable Oil Securities Co., 2525, Liberty Avenue, Pittsburg, Pa., U.S.A. Application date, July 3, 1923.

This apparatus is for producing a non-oxidising catalyst in the form of a black flaky powder from a solution of nickel

Fig. 1

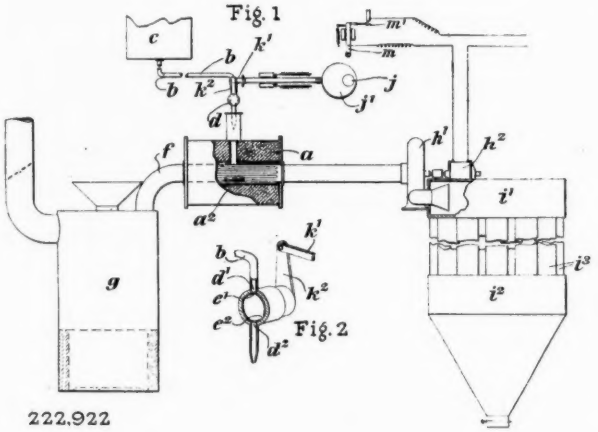


Fig. 2

222,922

nitrate and sugar. In such a process the proportions of the substances used, the temperature of the reaction, and the time of the reaction, must be accurately determined. The product must be kept out of contact with air when hot, and the manufacture must be effected in an inert gas. The solution is fed intermittently in measured quantities to a muffle furnace connected to a gas generator. The supply of the solution and inert gas, and the withdrawal of the reaction products and gases are automatically controlled. The product is withdrawn from the muffle in suspension in the inert gas, and deposited after cooling in a suitable filter.

The muffle furnace *a* is of the electrical resistance type, and is heated to 550° to 650° C. The solution to be treated is fed from a tank *c* through a pipe *b* and measuring valve *d* into a trough a^2 in the furnace. The valve *d* has opposite ports d^1, d^2, and a hollow rotary plug *e* having inlet and outlet ports, e^1, e^2. The latter are so spaced that when the ports d^1, e^1 are in register, the ports d^2, e^2 are out of register, and *vice versa*. The capacity of the plug *e* is sufficient to supply the required volume of solution to the trough a^2. The furnace *g* may contain incandescent charcoal, through which air is passed to produce carbon dioxide, which passes out through the pipe *f* to the furnace *a*. The intermittent passage of gas through the furnace *a* is obtained by an electrically driven exhaust fan h^1, and the gas containing the catalyst in suspension is discharged into a collector i^1, the gas then passes downwards through a number of cloth tubes i^3, which permit the gradual escape of gas and cooling of the catalyst before it comes into contact with the air. The catalyst is finally collected in the hopper i^2.

The automatic timing device comprises the shaft *j*, which is continuously rotated at a low speed. The valve *d* is oscillated at the required intervals by the eccentric j^1 acting through rods *k*, k^1 and crank k^2. The eccentric j^1 also reciprocates a rod *m* at the desired time interval after actuating the valve *d*. The valve *m* carries an electrical contact m^1 which controls the circuit to the motor h^2. The solution in the trough a^2 takes the form of an incandescent ball from the surface of which the particles of black flaky powder are discharged. No movement of gas takes place in the apparatus during the actual production of the catalyst.

222,947. Dyestuffs, Manufacture of. C. M. Barnard, 30, South Parade, Chelsea, London, S.W.3. Application date, July 10, 1923.

These dyestuffs are made by treating a dimethylated amine of the aromatic series such as dimethyl-aniline, dimethyl-α-naphthylamine, or dimethyl-β-naphthylamine, with phosphorus pentachloride, or phosphorus trichloride and chlorine. In an example, a mixture of dimethyl-aniline and phosphorus pentachloride is heated to 100° C. under a reflux condenser until hydrochloric acid gas ceases to be evolved. Phosphorus trichloride is distilled off, and sodium hydroxide is added until the mixture is alkaline. Any residual dimethyl-aniline is distilled off with steam, and the product diluted with boiling water. The dye base settles and is run off, and may be converted into the oxalate by adding the correct quantity of oxalic acid and heating nearly to 100° C. The dyestuff gives a bluer colour on tannin mordanted cotton than that obtained with methyl violet B.

223,015. Sodium Carbonate, Manufacture of. H. E. Cocksedge, Milford, Hartford, Cheshire. Application date, August 21, 1923.

Specification No. 202,678 (see The Chemical Age, Vol. IX, p. 348) describes a process for obtaining a double carbonate, $Na_2CO_3.3NaHCO_3$, by heating the crude bicarbonate obtained from the ammonia soda process for about 1½ hours at 98° C. If the double salt is then heated in a stirred and closed vessel to about 130° to 150° C., carbon dioxide is driven off and the anhydrous carbonate Na_2CO_3 is obtained. The process may be conducted continuously by passing the crude bicarbonate through a closed vessel in which there are two temperature zones, so that the double salt is first formed and then the soda ash. It has been found that soda ash so prepared is exceptionally bulky and of low specific gravity. Thus the apparent specific gravity is 0·27 compared with 0·5 to 1·05 for "light" or "heavy" commercial soda ash. The decomposition of the double salt may be stopped before the normal carbonate is obtained, while still giving a bulky product.

223,066. Hydrocarbons, Method of Refining. V. L. Oil Processes, Ltd., O. D. Lucas and E. L. Lomax, Vickers House, Broadway, Westminster, London. Application date, November 14, 1923.

The object is to refine hydrocarbons of the lighter type to obtain motor fuel, and to avoid removing from the fuel ingredients which may be safely left in it. In the usual process of washing the crude distillate first with strong sulphuric acid, and then with alkali, the loss from such refining amounts to

25 to 28 per cent. In this invention the distillate is treated with weak acid and alkali, and then heated under a pressure which prevents evaporation, to a temperature above the normal boiling point of its highest boiling constituent. The hydrocarbon is then caused to expand as a vapour into a heated filtering chamber containing a polymerising agent which separates undesirable constituents. The oil may be subjected to preliminary fractional distillation into two fractions boiling up to 130° C. and from 130° to 200° C. respectively. These fractions are then treated separately, the heating prior to the expansion being up to 180° to 200° C. at a pressure of about 130 to 150 lb. per square inch. The preliminary washing may be effected with 2 per cent. of 65 per cent. acid (chamber acid), and 5 per cent. caustic soda of 10 per cent. strength. This does not remove the useful unsaturated constituents, which would be removed by strong acid. The filtering material for the vapour may be floridine, bauxite, activated carbon or other purifying agent. A small proportion of hydrogen or carbon dioxide is introduced into the filtering chamber, and increases the flow of vapour through the filtering substance by 100 per cent., while it reduces the equilibrium point of solubility of polymerised bodies in the vapour, so that these bodies are substantially eliminated. The hydrocarbon vapour is condensed, and the inert gas returned to the system. This process produces a permanent water-white spirit free from objectionable odour, and with a loss of less than 10 per cent.

223,082. Barium Cyanide, Process for the Manufacture of. C. Deguide, 11, Rue du Casino, Enghien (Seine et Oise), France. Application date, December 10, 1923.

In the production of barium cyanide by passing nitrogen at a high temperature over a mixture of carbon and barium carbonate, difficulties are experienced due to the fact that the barium carbonate melts before the reaction commences, and may combine with the refractory materials of the furnace. In this invention, the mixture is rendered infusible by the addition of barium ortho-silicate, Ba_2SiO_4. This substance may be added in the proportion of one-half to one molecule to each molecule of barium carbonate. This addition effects an economy of barium carbonate and of fuel, and renders possible the use of rotating furnaces of high yield. The product is a mixture of barium cyanide, barium silicate, carbon, barium carbonate, etc., and may be used for producing synthetic ammonia or alkali cyanides.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention :—201,940 (W. Eberlein), relating to manufacture of silicates of the basic dyestuffs, see Vol. IX, p. 402 ; 202,654 (J. N. A. Sauer), relating to purifying and sterilising liquids and gases, see Vol. IX, p. 465; 206,512 (F. Pollak), relating to condensation products from formaldehyde, urea, thiourea, or their derivatives, see Vol. X, p. 72 ; 207,499 (Naugatuck Chemical Co.), relating to manufacture of formaldehyde condensation products of aliphatic amines, see Vol. X, p. 122 ; 209,757 (Compagnie Générale des Produits Chimiques de Louvres), relating to manufacture of zinc sulphide, see Vol. X., p. 300 ; 211,857 (Naamlooze Vennootschap Stickstof Bindings Industrie Nederland), relating to production of ammonia from products containing alkali cyanides and complex cyanides. see Vol. X, p. 470 ; 215,000 (Ledoga Soc. Anon, and C. Maimeri), relating to diethyl sulphate from ethylene, see Vol. XI, p. 17.

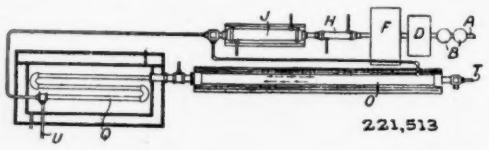
International Specifications not yet Accepted

221,512. Alcohol and Ethyl Hydrogen Sulphate. Compagnie de Bethune, Soc. Anon., Bully-les-Mines, Pas-de-Calais, France. International Convention date, September 7, 1923.

Gases containing ethylene are passed at ordinary or increased pressure through hot concentrated sulphuric acid containing a constant proportion of ethyl hydrogen sulphate. The ethylene content should be 11–18 per cent., and it is found that this mixture absorbs ethylene more readily than sulphuric acid alone. The absorption is effected in a vessel containing sulphuric acid which is heated and stirred, and fresh sulphuric acid is continuously added, while ethyl hydrogen sulphate mixed with sulphuric acid is drawn off.

221,513. Nitric Acid. Synthetic Ammonia and Nitrates, Ltd., Billingham, Stockton-on-Tees. (Assignees of L. H. Greathouse, Washington, U.S.A.) International Convention date, September 6, 1923.

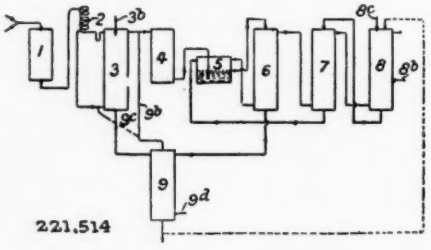
Ammonia and air are compressed by compressors B and catalytically converted into nitrogen oxides in a chamber D. The gases pass through an air cooler F, a water cooler H and



another cooler J where the temperature is reduced to 0° C. The condensed nitric acid is drawn off and cooled to 10° C. in a cooler O, and the cooled acid passes through pipes Q which receive the uncondensed oxides from the cooler J. The pipes Q are maintained at −10° C. by means of brine. Uncondensed gases from the cooler Q pass in counter-current through the cooler O to the outlet T, and their energy of compression may be used for refrigeration. Nitric acid of 60–70 per cent. strength is obtained.

221,514. Ammonium Nitrate and Nitrite. Synthetic Ammonia and Nitrates, Ltd., Billingham, Stockton-on-Tees. (Assignees of L. H. Greathouse, Washington, U.S.A.) International Convention date, September 6, 1923.

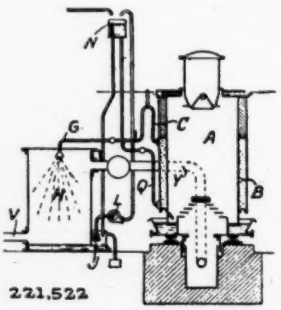
This invention comprises a plant by which nitrogen oxides are partly absorbed in ammonium bicarbonate to obtain ammonium nitrate and nitrite, and partly converted into



nitric acid which is then used to oxidise the nitrite. Nitrogen oxides are produced in a converter 1 from a mixture of air and synthetic ammonia, and pass through a condenser 2 to an absorption tower 3 supplied with water at 3*b*. The gases then pass through an oxidiser 4 and ammonium bicarbonate absorbers 5, 6, 7. Most of the nitrogen oxides are absorbed, and carbon dioxide is liberated and is absorbed in ammonia in the absorber 8. Tower 6 contains a mixture of nitrate and nitrite, which is passed to the tower 9 and oxidised with nitric acid from the tower 3, air being introduced at 9*d*. The absorption by ammonium bicarbonate is effected at 0° C., an excess of bicarbonate being used to avoid the formation of free nitric acid. The ammonium nitrate is finally evaporated.

221,522. Gas Producers. F. Morawski, Wartberg, Murztal, Styria, Austria. International Convention date, September 7, 1923.

A gas producer A is provided with a water-jacket B, the hot water from which passes through a pipe C to a sprayer G in a vessel H. Air entering the vessel H is thus heated and saturated, and is then supplied to the producer through a pipe Y. The quantity of water supplied to the sprayer G is regulated by the height of the tank N, to which surplus water is raised from J by a pump L for return to the jacket B.



221,773. DISTILLING TARS. Rütgerswerke Akt.-Ges. and L. Kahl, 33, Lützowstrasse, Berlin. International Convention date, September 11, 1923. Addition to 208,691.

When tars are fractionally distilled, those fractions containing solids are cooled to obtain the crystals, which are then separated and drained. These solids are distilled, and the vapour passed through a reflux column and collected in narrow fractions. Naphthalene, acenaphthene, fluorene, diphenylene oxide, phenanthrene, anthracene, fluoranthrene and pyrene are obtained.

221,788. PRESERVING INDIARUBBER. Robel and Fiedler Ges., 98, Seeburgstrasse, Leipzig, Germany. International Convention date, September 13, 1923.

Rubber is preserved by a substance having a negative catalytic effect on the oxidation of the sulphur, such as a mixture of glycerine with benzaldehyde, or a solution of phenylhydrazine and glucose. In an example, a solution of rubber 60 parts in paraffin oil 600 parts is treated with a mixture of talcum 1,300 parts, glycerine 172 parts and benzaldehyde 34 parts, and heated to 180° C. for two hours.

221,802. SEPARATING HAFNIUM AND ZIRCONIUM. Naamlooze Vennootschap Philip's Gloeilampenfabrieken, 6, Emmasingel, Eindhoven, Holland. International Convention date, September 15, 1923.

The mixed halogenides of hafnium and zirconium are fractionally distilled in the presence of a halogenide of an element of the fifth or sixth periodic group, such as phosphorus, arsenic, antimony, molybdenum or tungsten, whose highest valency is five or six. Between 230° C. and 360° C. the fraction obtained is richer in hafnium, and between 360° C. and 410° C. the fraction is richer in zirconium. If phosphorus chloride has been used, the fractions may be treated with water to obtain phosphates.

LATEST NOTIFICATIONS.

224,199. Production of lead acetate. Plaueln, R. October 30, 1923.

224,214. Refractory cement with a base of zirconium ore. Soc. d'Etude des Agglomeres. October 29, 1923.

224,218. Dyeing of artificial silk. Soc. Alsacienne de Produits Chimiques. November 3, 1923.

224,223. Manufacture of magnesium sulphate from raw materials consisting of gypsum and dolomite. Soc. des Mines de Potasse d'Alsace Amelie, Max, Joseph, Else, Theodore, Prince Eugene, Fernand (Autrefois Reichsland), Anna, Marie, et Marie-Louise. October 29, 1923.

224,235. Processes of mechancially roasting ore. Compagnie Générale des Produits Chimiques de Louvres. October 30, 1923.

224,252. Process for purification and decoloration of oils and fats. Duclaux, J. November 2, 1923.

Specifications Accepted with Date of Application

207,162. Naphthalene derivatives, Manufacture of, and of dyestuffs therefrom. Society of Chemical Industry in Basle. November 18, 1922.

210,463. Diazo dyestuffs, Manufacture of. Durand and Huguenin Akt.-Ges. January 29, 1923.

216,110. Colloidal substances, Process and apparatus for the mechanical production of. W. Ostermann, and Sudenburger Maschinenfabrik und Eisingiesserei Akt.-Ges. May 18, 1923.

215,316. Mercury derivatives of hydroxy-sulpho-benzoic acids and their homologues, Process for the production of, suitable for use in therapeutics. Chemosan Akt.-Ges. April 30, 1923. Addition to 202,631.

219,272. Non-peroxidising ether, Process for producing. Nederlandsche Gist- en Spiritusfabriek. July 21, 1923.

219,273. Ether, Process of producing chemically pure, toxic-free narcotising. Nederlandsche Gist- en Spiritusfabriek. July 21, 1923.

220,935. Viscose products. Manufacture of. Akt.-Ges. für Anilin Fabrikation. August 22, 1923.

222,426–7. Fused cement, Process for the manufacture of—and apparatus therefor. Soc. Anon. des Chaux et Ciments de Lafarge et de Teil. September 29, 1923.

223,617. Alloys containing iron and chromium, molybdenum or uranium, Purification of. W. Borchers and R. W. Stimson. April 24, 1923.

223,622. Alloys containing iron and chromium, molybdenum or uranium, Production of. W. Borchers and R. W. Stimson. April 27, 1923.

223,624. Carbonised fuel, Manufacture of—and apparatus therefor. S. R. Illingworth and Illingworth Carbonisation Co., Ltd. May 23, 1923.

223,626. Iron-manganese alloys, Manufacture of. A. C. Hyde and W. L. Turner. June 21, 1923.

223,636. Resin-like condensation products, Production of. R. Tarassoff. July 18, 1923.

223,652. Retort apparatus for the treatment of materials such as shale, coal, and the like. W. Guy-Pell. July 24, 1923.

223,656. Centrifugal separators for dehydrating or otherwise purifying oil. De Lavel Chadburn Co., Ltd., and H. Johnstone. July 25, 1923.

223,741. Ores, Process and plant for roasting. A. D. H. L. Fassotte, and Compagnie des Métaux Overpeltlommel Soc. Anon. October 26, 1923.

223,800. Soluble barium salts, Process for the production of. A. Jahl and J. Michael and Co. February 27, 1924.

Applications for Patents

Akt.-Ges. für Anilin-Fabrikation and Bloxam, A. G. Manufacture of quinonoid derivatives or 2 : 1-naphthophenothiazine. 26,629. November 7.

Badische Anilin und Soda-Fabrik, and Johnson, J. Y. Manufacture of vat colouring matters. 26,530. November 6.

Calder, W. A. S., and Chance and Hunt, Ltd. Manufacture of sulphuric acid. 26,435. November 5.

Carpmael, E., and Farbenfabrieken vorm. F. Bayer and Co. Manufacture of dyestuffs. 26,715. November 8.

Chemical Engineering Co. (Manchester), Ltd., and Spensley, J. W. Refining or clarifying oils. 26,143. November 3.

Duclaux, J. Purification and decoloration of oils and fats. 26,205. November 3. (France, November 2, 1923.)

Farbwerke vorm. Meister, Lucius, and Brüning, and Imray, O. Y. Manufacture of water-soluble condensation products. 26,730. November 8.

Farrell, E. Bleaching, etc., vats. 26,348. November 5.

Girouard, Sir E. P. C. Manufacture of Portland Cement. 26,271. November 4.

Imray, O. Y., and Soc. of Chemical Industry in Basle. Process of making disperse systems. 26,215. November 3.

Imray, O. Y., Manufacture of esters of unsaturated acids. 26,628. November 7.

Naamlooze Vennootschap Hendelmaatschappij Grikro. Manufacture of zinc oxide. 26,660. November 7. (Germany, December 3, 1923.)

Soc. Chimique de la Grande Paroisse, Azote et Produits Chimiques. Manufacture of fertilisers. 26,401. November 5. (France, March 13.)

Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. Manufacture of hydrogen. 26,286. November 4. (France, June 3.)

Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. Purification of hydrogen, etc. 26,399. November 5. (France, August 5.)

Techno-Chemical Laboratories, Ltd. Interchange of heat. 26,314. November 4.

Fractional Horse-power Electric Motors

AN interesting display of small electric motors in various applications has been arranged by Pooley and Austin at their premises at 34, Broadway, Westminster, London, S.W.1. These motors range from $\frac{1}{50}$ h.p. to $\frac{3}{4}$ h.p. in standard sizes, and the display illustrates very clearly the wide range of uses to which they can be put. Uses of chemical interest include the driving of laboratory stirrers, super centrifuges, small normal centrifuges, small pumps, air blowers and so on. Other uses include driving of invalids' wheeled chairs, lathes, coffee grinders, addressing machines, etc. The motors are all Wilson-Wolf fractional horse-power motors, which have been standardised by various makers of small plant, tools, etc., and most of the exhibits in the display were loaned by these manufacturers. Thus there was an acid titration apparatus with stirrer by Gallenkamp, an air blower by Griffen, and a Du Laval oil separator.

The motors themselves are carefully standardised and beautifully made, largely from die-castings of a hard aluminium alloy. Other useful features are the self-aligning bearings and the neat lubricating arrangements. They can be supplied, of course, in various voltages for alternating current, direct current, or suitable for both if desired. There are also alternative windings for different classes of work.

It may be pointed out that such motors provide the user with all the advantages of electric power applicable to small tools and apparatus, while the standardised methods of construction and the fact that they will work equally well in any position is a great advantage for manufacturers of such articles.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.

London, November 13, 1924.

THERE has been undoubtedly an expansion in the volume of trade during the last week. In all directions a much greater feeling of confidence is apparent. It is recognised that the fall in prices has in many cases been overdone and a general improvement in values is anticipated. Price changes are in the main in an upward direction. Export inquiry is fair and improving.

General Chemicals

ACETONE is in fair demand, price about £93 per ton.

ACID ACETIC is lower in price. Technical 80% quoted at £41 per ton and pure, 80%, at £43 per ton. The market remains affected by Continental realisations.

ACID CITRIC is quiet and unchanged at about 1s. 3d. per lb.

ACID FORMIC has been in much more active demand, 85% is quoted at £52 10s. to £53 per ton, ex wharf.

ACID LACTIC.—Unchanged at £43 per ton for 50% by weight.

ACID OXALIC is in very good demand. There is a general expectation of higher prices. Quotation for small amounts is 4d. per lb., delivered, which can be shaded for quantities.

ACID TARTARIC.—Manufacturers are firm in their price, but second-hand realisations continue ; there is no established market.

ALUMINA SULPHATE.—Unchanged at £7 5s. per ton for 17-18%.

ARSENIC.—Very slow of sale. The nominal price for Cornish make is unchanged, but Japanese parcels are offered at a sacrifice, and can be bought at round about £34 to £35 per ton.

BARIUM CHLORIDE is in fair demand at about £12 10s. per ton.

COPPER SULPHATE.—A fair business is passing. Price ruling is about £23 per ton.

CREAM OF TARTAR.—Unchanged at £79 to £80 per ton.

FORMALDEHYDE.—The tendency remains in buyers' favour. Price £48 per ton, ex wharf.

EPSOM SALTS seem likely to advance in price and figure to-day at about £4 5s. per ton.

LEAD ACETATE has been in good demand, particularly on export account. To-day's price is £45 10s. to £46 for white and £42–£43 per ton for brown.

LEAD NITRATE.—Unchanged.

LIME ACETATE is being realised by weak holders and the price is nominal. Any increase in demand however would probably bring about a rapid change in the situation.

MAGNESIUM CHLORIDE.—Unchanged.

METHYL ALCOHOL is in slow demand at £60 per ton.

CAUSTIC POTASH.—Price is firmly held, although demand remains on the small side.

POTASH CARBONATE. The same remarks apply.

POTASH PERMANGANATE is still rather weak at about 7¼d. per lb.

POTASH PRUSSIATE is a fair market at about 7½d. per lb.

SODA ACETATE.—Lower prices were in evidence a few days ago, but the market has improved again and to-day is about £22 10s. per ton.

SODA BICHROMATE is unchanged at 4¼d. less 5%.

SODA HYPOSULPHITE is a fairly active market at about £9 10s. per ton.

SODA NITRITE is in steady demand at £24 10s. to £25 per ton.

SODA PRUSSIATE is rather firmer—price 4⅛d. to 4¼d. per lb.

SODA SULPHIDE.—Unchanged.

BICHROMATES.—The English makers have again reduced their prices for shipment to certain Continental and overseas markets. There is an extensive list of prices for various destinations which the makers supply on request.

Coal Tar Products

The tone of the market in all coal tar products is steady, while the prices of many have an upward tendency.

90% BENZOL is in very fair demand, and prices are a shade higher than last week. Its value is from 1s. 5d. to 1s. 5½d. per gallon on rails.

PURE BENZOL is steady at 1s. 8d. to 1s. 8½d. per gallon on rails.

CREOSOTE OIL is steady at 5¼d. to 5½d. per gallon on rails in the North, while the price in the South is from 6d. to 6¼d. per gallon.

CRESYLIC ACID shows no change from last week, and the pale quality 97/99% is worth 1s. 11d. per gallon on rails, while the dark 95/97% quality is quoted at 1s. 7d. to 1s. 7½d. per gallon.

SOLVENT NAPHTHA shows a slight increase in value from last week, and is quoted at 1s. 2d. to 1s. 3d. per gallon on rails, with supplies scarce for the near position.

HEAVY NAPHTHA is quoted at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENES are in poor demand, the low qualities being quoted at £3 10s. to £4 10s. per ton, while of the higher grades the 76/78 quality is worth from £6 to £6 10s. per ton ; and 74/76 quality is quoted at from £5 10s. to £6 per ton.

PITCH is somewhat quiet. Prices remain unchanged at 45s. to 50s. f.o.b. London, and 45s. to 47s. 6d. f.o.b. East and West Coast.

SULPHATE OF AMMONIA is in good demand and prices are well maintained.

Nitrogen Products Market

The market has been quiet during the past week, producers are still holding firmly for £13 15s. per ton, f.o.b. for prompt delivery, and £14 to £14 10s. per ton, f.o.b. for forward.

The possible demand from the United States has not yet materialised, though buyers over there are frequently making inquiries. There is every prospect of these prices being maintained, unless unexpected developments take place.

Home Trade.—The producers are making sales of normal quantities for delivery between now and December 31, at prices which were reported on the 29th ult.

Nitrate of Soda.—The nitrate of soda market is unchanged. There have been keen sales at £11 15s. to £11 18s. per ton for prompt, whereas prices round about £12 2s. 6d. have been maintained for January/February. At the moment there are more sellers than buyers, and it appears that a rather larger quantity has been arranged for Europe than is likely to be consumed. It is expected, however, that the American consumption will be fully up to estimates.

American Market Movements

(From *Drug and Chemical Markets.*)

INDUSTRIAL chemicals maintained a steady tone throughout the week. Manufacturers report an increasing volume of business at unchanged prices. Dyes and intermediates are stated to be in improved demand as consuming industries show increased activity. Prices are showing little variation from week to week. Benzol continues in limited supply at firm prices. Tallow and palm oil are leading the way in a general strengthening in fatty oils. Stearic acid and red oil are stronger. Linseed oil is holding at the recent high rates. Chinawood oil is easier. Rosins and turpentine have advanced.

Fine chemicals are in active demand, especially bromides, codliver oil, thymol, and menthol. Japan refuses to quote menthol. Antipyrine is lower. Essential oil market is generally firm, and higher prices have been registered in oils, peppermint, bois de rose, lemon, anise, and cedar wood. Oil caraway is easy.

Nitrogen Products Report

A LONDON firm is anxious to obtain a copy of the Final Report of the Nitrogen Products Committee, which for some time has been out of print. Any reader who has one to spare will be put in touch with the inquirer.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.

General Heavy Chemicals

Acid Acetic 40% Tech.—£23 10s. per ton.

Acid Boric, Commercial.—Crystal, £45 per ton. Powder, £47 per on

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., accordin to purity, strength and locality.

Acid Nitric 80° Tw.—£21 10s. to £27 per ton, makers' wnrks according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' w rks, with slight variations up and down owing to local considerations : 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £11 d/d. ; Contract, £10 d/d. 4 ton lots.

Bisulphite of Lime.—£7 10s. per ton, packages extra.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride.—£5 17s. 6d. per ton d/d.

Copper Sulphate.—£25 per ton.

Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d. Normal business.

Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5½d. per lb.

Potassium Chlorate.—3d. to 4d. per lb.

Salammoniac.—£32 per ton d/d.

Salt Cake.—£3 10s. per ton d/d.

Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d. per ton, according to strength ; 20s. less for contracts.

Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£24 per ton.

Sodium Bicarbonate.—£10 10s. per ton carr. paid.

Sodium Bichromate.—4½d. per lb.

Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.

Sodium Sulphide Crystals.—£9 per ton d/d.

Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—6½d. per lb. Quiet. Crude 60's 1s. 8d. to 1s. 10d. per gall. Market flat.

Acid Cresylic 97/99.—2s. to 2s. 1d. per gall. Demand steady. Pale 95%, 1s. 8d. to 2s. per gall. Not much inquiry. Dark, 1s. 8d. to 1s. 10d. per gall. Market dull.

Anthracene Paste 40%.—4d. per unit per cwt. Nominal price. No business.

Anthracene Oil, Strained.—6½d. to 7½d. per gall. Small demand. Unstrained, 6d. to 6½d. per gall.

Benzol.—Crude 65's.—7½d. to 9d. per gall., ex works in tank wagons. Standard Motor, 1s. 1½d. to 1s. 3d. per gall., ex works in tank wagons. Pure, 1s. 5½d. to 1s. 7d. per gall., ex works in tank wagons.

Toluol.—90%, 1s. 5d. to 1s. 6d. per gall. Demand good. Pure, 1s. 7d. to 1s. 9d. per gall.

Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.

Creosote.—Cresylic, 20/24%, 8d. to 8½d. per gall. Little demand. Middle Oil, Heavy, Standard specification, 5½d. to 6½d. per gall., according to quality and district. A little more demand for export in bulk.

Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. to 1s. 3d. per gall. Demand good. Solvent 90/190, 11d. to 1s. per gall. Fair inquiry. Local demand good.

Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand slightly better. Whizzed or hot pressed, £6 to £9 per ton. Demand very poor.

Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to district.

Pitch.—Medium soft, 42s. 6d. to 60s. per ton. Plenty of inquiry, prospects brighter. Price too low to interest distillers.

Pyridine.—90/160, 19s. per gall. Steady demand. Heavy, 11s. to 12s. Market dull.

Intermediates and Dyes

Business in dyestuffs has been very well maintained this week. There have been no alterations in prices to report.

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid H.—3s. 11d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d
Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
Acid Salicylic, technical.—1s. 1d. per lb. Improved demand.
Acid Sulphanilic.—9d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—1s. per lb. d/d.
Aniline Oil.—8d. per lb. naked at works.
Aniline Salts.—8½d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzidine Base.—3s. 11d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 19/31° C.—4½d. per lb. Rather quiet.
m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. to 3s. per lb.
Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.
p-Dichlorbenzol.—£85 per ton.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. 2½d. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. to 10d. per lb. naked at works.
Dinitrochlorbenzol.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
Monochlorbenzol.—£63 per ton.
B-Naphthol.—1s. per lb. d/d.
a-Naphthylamine.—1s. 3½d. per lb. d/d.
B-Naphthylamine.—4s. per lb. d/d.
m-Nitraniline.—4s. 2½d. per lb. d/d.
p-Nitraniline.—2s. 2½d. per lb. d/d.
Nitrobenzene.—5½d. to 5½d. per lb. naked at works.
o-Nitrochlorbenzol.—2s. per lb. 100% basis d/d.
Nitronapthalene.—10½d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100 % basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—3s. 10d. per lb. d/d.
p-Phenylene Diamine.—10s. 2d. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
o-Toluidine.—10d. per lb.
p-Toluidine.—3s. per lb. naked at works.
m-Toluylene Diamine.—3s. 10d. per lb. d/d.

Wood Distillation Products

There is a general feeling that the fall in price of acetates during the last few weeks has reached its limit. The tendency is now to stiffen again.

Acetate of Lime.—Brown £11 10s. per ton d/d. and upward. Grey, £14 per ton. Liquor, 9d. per gall. 32° Tw.
Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Demand quiet, but price steady.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
Wood Creosote.—2s. 9d. per gall. Unrefined.
Wood Naphtha, Miscible.—4s. 9d. per gall. 60% O.P. Solvent, 5s. per gall. 40% O.P. Firmer.
Wood Tar.—£4 to £5 per ton. Very quiet.
Brown Sugar of Lead.—£41 per ton. Steady market.

Rubber Chemicals

Antimony Sulphide.—Golden, 6½d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.
Arsenic Sulphide, Yellow.—1s. 11d. per lb.
Barytes.—£3 10s. to £6 15s. per ton, according to quality.
Cadmium Sulphide.—3s. 9d. to 4s. per lb., according to quantity.
Carbon Bisulphide.—£30 to £33 per ton, according to quantity. Again dearer.
Carbon Black.—7d. to 7½d. per lb., ex-wharf. Dearer.
Carbon Tetrachloride.—£60 to £65 per ton, according to quantity, drums extra. Again dearer.
Chromium Oxide, Green.—1s. 3d. per lb.
Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.
Lamp Black.—£48 per ton, barrels free.
Lead Hyposulphite.—7½d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.

Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra. Dearer.
Sulphur Precip. B.P.—£47 10s. to £52 10s. per ton according to quantity.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 1d. per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£45 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—3s 1d. to 3s. 3d. per lb., according to quantity. Sales steady. Price firm.
Acid, Benzoic B.P.—2s. 6d. per lb. Cheaper.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4d. per lb., less 5% for ton lots. Market still weak.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in 2 cwt. lots.
Acid, Pyrogallic, Crystals.—6s. 9d. per lb. for 1 cwt. lots. Market firm. Increasing demand.
Acid, Salicylic.—1s. 6d. to 1s. 8d. per lb , according to quantity.
Acid, Tannic B.P.—2s. 10d. per lb. Forward quotations higher. Spot value likely to increase.
Acid, Tartaric.—1s. per lb., less 5%.
Amidol.—9s. per lb. d/d.
Acetanilide.—1s. 10d. to 2s. per lb. More inquiry.
Amidopyrin.—15s. per lb. for spot stocks.
Ammonium Benzoate.—3s.3d.to 3s.6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—13s. 9d. per lb. Slightly lower. Quiet steady demand.
Benzonaphthol.—5s. 3d. per lb. Small inquiry.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—10s. 6d. to 12s. 6d. per lb.
Bismuth Citrate.—10s. 3d. to 12s. 3d. per lb.
Bismuth Salicylate.—9s. 0d. to 11s. 0d. per lb.
Bismuth Subnitrate.—9s. 8d. to 10s. 8d. per lb.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 9d. per lb.; sodium, 1s. 10d. per lb.; ammonium, 1s. 11d. per lb. Market firm and prices advancing. Raw materials dearer. British prices lower.
Calcium Lactate—1s. 7d. to 2s., according to quantity. Fair demand and steady market.
Chloral Hydrate.—4s. per lb. Slightly easier.
Chloroform.—2s. 6d. per lb. for cwt. lots. Price advanced by 6d. per lb.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£48 to £49 per ton, in barrels ex wharf London.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—9s. 9d. per lb.
Hexamine.—3s. per lb. Forward prices higher.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 1d. to 2s. 5d. per lb., according to quantity.
Magnesium Carbonate.—Light Commercial, £36 per ton net.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 60s. per lb. For December deliveries. No spot deliveries available. Synthetic, 26s. to 35s. per lb. Increasing demand.
Mercurials.—Market very quiet. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
Methyl Salicylate.—1s. 10d. to 2s. per lb.
Methyl Sulphonel.—22s. 6d. per lb. Slightly weaker.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 8d. for B.P. Quality.
Paraldehyde.—1s. 4½d. to 1s. 6d. per lb., in free bottles and cases.
Phenacetin.—5s. 6d. per lb.
Phenazone.—7s. per lb.
Phenolphthalein.—5s. 6d. per lb. For cwt. lots.
Potassium Bitartrate 99/100% (Cream of Tartar).—84s. per cwt. less 2½% for ton lots.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb. Dearer.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Good steady demand.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Forward prices higher.
Quinine Sulphate.—2s.3d. to 2s. 4d. per oz., in 100 oz. tins. Good market.
Resorcin.—5s. 3d. per lb.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 9d. per lb., for cwt. lots.
Silver Proteinate.—9s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—2s. 6d. per lb. Ample supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton. according to quantity, d/d. consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb. Less for quantity.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 82s. 6d. per cwt., according to quantity. Market steady, good demand.
Sodium Salicylate.—Powder, 2s. to 2s. 3d. per lb. Crystal, 2s. 2d. to 2s. 5d. per lb. Flake, 2s. 6d. per lb.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb., according to quantity.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity, 1 cwt. kegs included.
Sulphonal.—14s. 6d. per lb. Little demand.
Thymol.—16s. 9d. per lb. Firmer.

Perfumery Chemicals

Acetophenone.—12s. per lb.
Aubepine.—15s. 3d. per lb.
Amyl Acetate.—2s. 9d. per lb.
Amyl Butyrate.—6s. 9d. per lb.
Amyl Salicylate.—3s. 3s. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—3s. 6d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—18s. 9d. per lb.
Coumarin.—18s. 9d. per lb. Cheaper.
Citronellol.—17s. per lb.
Citral.—8s. per lb.
Ethyl Cinnamate.—12s. 6d. per lb.
Ethyl Phthalate.—3s. 3d. per lb.
Eugenol.—10s. per lb.
Geraniol (Palmarosa).—33s. 6d. per lb.
Geraniol.—11s. 6d to 18s. 6d. per lb.
Heliotropine.—6s. 9d. per lb.
Iso Eugenol.—16s. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—9s. 6d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—45s. per lb. Cheaper.
Musk Xylol.—13s. 6d. per lb.
Nerolin.—4s. 9d. per lb.
Phenyl Ethyl Acetate.—15s. per lb.
Phenyl Ethyl Alcohol.—16s. per lb.
Rhodinol.—55s. per lb.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb.
Vanillin.—25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 10d. per lb.
Bergamot Oil.—16s. per lb. Cheaper.
Bourbon Geranium Oil.—35s. per lb. Dearer.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—11s. per lb. Dearer.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. 9d. per lb. Cheaper.
Citronella Oil.—Java, 85/90%, 6s. 10½d. per lb. Ceylon, 3s. 8d. per lb.
Clove Oil.—8s. per lb.
Eucalyptus Oil, 70/75%.—2s. 3d. per lb.
Lavender Oil.—French 38/40% Esters, 32s. 6d. per lb.
Lemon Oil.—3s. per lb.
Lemongrass Oil.—5s. per lb. Dearer.
Orange Oil, Sweet.—11s. per lb.
Otto of Rose Oil.—Bulgarian, 40s. per oz. Anatolian, 18s. per oz.
Palma Rosa Oil.—16s. 6d. per lb.
Peppermint Oil.—Wayne County, 32s. 6d. per lb. Japanese, 21s. per lb. Practically unobtainable for spot or near delivery.
Petitgrain Oil.—9s. 9d. per lb. Dearer.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, November 13, 1924.

THERE has been a decidedly better tone in the heavy chemical market during the past week, numerous inquiries being received and orders booked good in proportion. Prices in quite a number of cases show an upward tendency.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £57 to £68 per ton; 80% pure, £45 to £47 per ton; 80% technical, £44 to £46 per ton. All packed in casks delivered c.i.f. U.K: ports, duty free.

ACID BORACIC.—Remains unchanged. Crystal or granulated, £45 per ton; powdered, £47 per ton carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Nominally 5d. per lb., delivered.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 3½d. per lb. less 5% ex store. Offered for early delivery at about 1s. 3d. per lb., less 5% ex wharf.

ACID FORMIC, 85%.—Spot material on offer at about £54 per ton, ex store. Quoted £50 to £51 per ton c.i.f. U.K. ports, duty free.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Rather better inquiry and price unchanged at about 3¾d. per lb., ex store. Offered for prompt shipment from the continent at 3½d. per lb., c.i.f. U.K. ports.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In little demand. Price about 1s. per lb., less 5% ex store, but could probably be obtained for less.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Quoted £6 17s. 6d. per ton, c.i.f. U.K. port, prompt shipment. Spot lots available at about £7 17s. 6d. per ton, ex store.

ALUM.—Ammonium chrome alum quoted £18 10s. to £20 10s. per ton according to quality, f.o.b. U.K. port. Lump potash alum on offer at about £9 15s. per ton, ex store. Quoted £8 15s. per ton, c.i.f. U.K. port, prompt shipment from the continent.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K. port.

AMMONIA LIQUID 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvanizers' crystals of English manufacture unchanged at £30 per ton, ex station. Offered from the continent at about £28 per ton, c.i.f. U.K. port. Fine white crystals now offered from the continent at about £23 per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Spot lots on offer at about £45 10s. per ton, ex store. Offered for early delivery at about £43 per ton, ex wharf. Foreign arsenic on offer at about £33 to £34 per ton, c.i.f. U.K. port.

BARIUM CARBONATE.—98/100% powdered, offered from the continent at £9 15s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—Spot lots unchanged at about £12 17s. 6d. per ton, ex store. Offered for prompt shipment from the continent at £11 10s. per ton, c.i.f. U.K. port.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station, contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Continental material on offer at about £5 per ton, ex store.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks free.

COPPER SULPHATE.—English material quoted £25 per ton, f.o.b. U.K. port for export. Continental on offer at about £24 per ton, ex wharf.

FORMALDEHYDE, 40%.—Nominally £50 per ton, ex store, but could probably be bought for less.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Fine white crystals on offer from the continent at about £3 per ton, c. i.f. U.K. port. Large crystals, 17s. 6d. per ton extra.

LEAD, RED.—Imported material now quoted £44 per ton, ex store.

LEAD, WHITE.—Unchanged at about £45 10s. per ton, spot delivery.

LEAD ACETATE.—Spot lots available at about £46 5s. per ton, ex store. Offered for early delivery at £46 per ton, ex station. Brown quoted £40 10s. per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Offered from the continent at £5 2s. 6d. per ton, c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Spot material available at about £31 15s. per ton, ex store. Offered for prompt shipment from the continent at about £31 per ton, c.i.f. U.K. port.

POTASSIUM BICHROMATE.—Unchanged at 5½d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Quoted £22 17s. 6d. per ton, c.i.f. U.K. port, prompt shipment. Spot lots unchanged at about £24 15s. per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at about 2¾d. per lb., ex wharf, prompt shipment from the continent. Spot lots available at about the same figure.

POTASSIUM NITRATE, SALTPETRE.—Quoted £26 per ton, c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 8d. per lb., ex store, spot delivery. Offered for prompt shipment from the continent at about 7½d. per lb. ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Now quoted 6¾d. per lb., ex store, spot delivery. Offered for prompt shipment from the continent at about 6½d. per lb., c.i.f. U.K. ports.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot lots unchanged at about £23 15s. per ton, ex store. Offered for prompt shipment from the continent at about £22 5s. per ton c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4¾d. per lb. delivered.

SODIUM CARBONATE, SODA CRYSTALS.—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £10 per ton ex station. Continental quoted £8 10s. per ton c.i.f. U.K. port. Spot lots available at about £9 15s. per ton ex store. Pea crystals of English manufacture unchanged at £13 15s. per ton ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 17s. 6d. per ton ex store. 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Unchanged at about £26 per ton ex store.

SODIUM PRUSSIATE, YELLOW.—Quoted 4d. per lb. ex store, spot delivery. Offered from the continent at slightly under this figure.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton f.o.r. works. Good inquiry for export.

SODIUM SULPHIDE.—60/65% solid of English manufacture, £4 15s. per ton ex station; broken, £1 per ton more; flake, £2 per ton more. 60/62% solid of continental manufacture quoted £12 5s. per ton c.i.f. U.K. port; broken, £1 per ton more. 31/34% crystals of English manufacture, £9 2s. 6d. per ton, ex station. 30/32% crystals of continental manufacture quoted £8 10s. per ton c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton ex store, prices nominal.

ZINC CHLORIDE.—96/98% of continental manufacture quoted £23 per ton c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton f.o.b. U.K. port.

ZINC SULPHATE.—Unchanged at about £12 15s. per ton ex store, spot delivery.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

DIMETHYLANILINE.—Some export inquiry. Price 2s. 2d. per lb., drums included.

META PHENYLENE DIAMINE.—Some home inquiry. Price 3s. 10d. per lb. delivered.

ORTHO TOLUIDINE.—Good export inquiries. Price 7d. per lb. f.o.b.

PHENYL 1 : 8 NAPTHYLAMINE SULPHONIC ACID.—Export inquiry. Price 5s. 6d. lb., 100% basis.

PARA AMIDO ACETANILIDE.—Some small home inquiries. Price 5s. lb., 100% basis.

TOLUYLENE DIAMINE SULPHONIC ACID.—Export inquiry. Price 8s. 6d. per lb.

DI AMIDO STILBENE DISULPHONIC ACID.—Some export inquiry. Price 7s. 3d. per lb., 100% basis.

The Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, November 13, 1924.

Business in chemicals on the Manchester market continues on quietly steady lines and a certain amount of interest is being taken by buyers in fixing up for future supplies. Home trade users, including the textile trades, are more active inquirers. The volume of export business is about the same as during the last few weeks and small parcels have recently been shipped to the Continent, the East, Canada and the United States. Prices, on the whole, keep fairly steady and in one or two instances are rather firmer. Arsenic is still a weak spot; but pitch, which has been in a very depressed condition for some time, appears to be opening out a little.

Heavy Chemicals

Prussiate of soda is in moderate demand and values are maintained at round 4d. per lb. Saltcake continues to attract comparatively little interest, with prices nominally unchanged at £3 10s. per ton. Glauber salts are in much the same position at about the same figure. Alkali is steady at £6 15s. per ton and a fair volume of business is being put through. Bichromate of soda meets with a fair amount of inquiry and values are held at 4¼d. per lb. Both home and foreign demand for caustic soda keeps up; quotations are unchanged at from £16 17s. 6d. per ton for 60 per cent. strength to £19 7s. 6d. for 76-77 per cent. Bleaching powder is still offering at £10 per ton, but the demand for this material is not too active. Sodium sulphide is in moderate request at £14 to £14 10s. per ton for 60-65 per cent. concentrated solid and £9 5s. per ton for crystals. The demand for hyposulphite of soda is restricted but values are steady at about £14 per ton for photographic crystals and £9 5s. for commercial. Phosphate of soda keeps quiet and about unchanged at round £13 5s. per ton. Soda crystals continue on the recent level of £5 5s. per ton, but buying interest is relatively small. Acetate of soda meets with a fair demand and values are steady at £23 to £23 5s. per ton. Chlorate of soda is unchanged either in position or price at round 2½d. per lb. Bicarbonate of soda keeps quiet but steady at £10 10s. per ton.

The demand for caustic potash and carbonate of potash is only on rather quiet lines but quotations have shown a firmer tendency. Caustic potash is on offer at £30 to £31 per ton for 90 per cent. material and carbonate at about £23 per ton. Yellow prussiate of potash is in fair request and though not actually changed from last week is a shade stronger at 6¾d. to 7d. per lb. Permanganate of potash is selling fairly well at 6¾d. to 7¼d. per lb. according to quality. Chlorate of potash is unchanged at 2¾d. per lb., a moderate amount of business being done. Bichromate of potash continues to attract some attention at the recent level of 5½d. per lb.

Arsenic keeps dull and values during the week have displayed further weakness, about £39 per ton now being quoted in Cornwall for white powdered and round £43 per ton in Manchester. Rather more business is said to have been done in sulphate of copper, which remains at £24 10s. to £25 per ton, f.o.b. Commercial Epsom salts are steady and in moderate inquiry at £4 15s. to £5 per ton; magnesium sulphate, B.P., is quoted at £6 10s. Acetate of lime is quiet but steady at £15 per ton for grey and £11 for brown. White acetate of lead keeps firm at about £46 per ton, with brown quoted at £42 10s. Nitrate of lead is quiet but without change at £42 per ton.

Acids and Tar Products

The demand for tartaric acid is quiet but values are steady at 11¾d. to 1s. per lb. Citric acid is firmer at 1s. 3½d. to 1s. 4d. per lb. Oxalic acid is still very dull at 3¾d. to 4d. per lb. Acetic acid is steady and in fair demand at £44 per ton for 80 per cent. commercial and £68 to £69 per ton for glacial.

There is more inquiry in the market for pitch and more actual business has been done; values are firmer at 47s. 6d. per ton. Creosote oil is maintained at 5¾d. per gal., but the demand is not too brisk. Carbolic acid keeps very quiet and weak at 5¾d. to 6d. per lb. for crystals and 1s. 9d. per gal. for crude material. Solvent naphtha is a little more active and values are firm at 1s. 4d. per gallon. Naphthalenes are in comparatively slow demand at about £15 per ton for refined and £5 and upwards for crude qualities. Cresylic acid is steady at 2s. 1d. to 2s. 2d. per gallon.

Tariff Changes

Basutoland, Bechuanaland, Etc.—Notices issued on October 4, 1924, remove the dumping duty imposed on superphosphates imported into Basutoland, Bechuanaland Protectorate, and Swaziland from Holland, and also the dumping freight duty imposed on superphosphates imported into these Territories from Great Britain, Holland, Belgium, or Germany.

Italy and Czechoslovakia.—The Commercial Convention between Italy and Czechoslovakia has resulted in numerous alterations and reductions in the Italian tariff. The reduced tariff duties provided for are applicable to goods originating in the United Kingdom. Full details of the articles affected will be found in *The Board of Trade Journal*, November 6, 1924.

New Caledonia (French).—A Decree imposes an export duty of 3 per cent. *ad valorem* on all goods originating in New Caledonia not subject to a special export duty. An export duty of 5 per cent. *ad valorem* is imposed on guano and other natural manures originating there.

Union of South Africa.—A Proclamation provides that rebates at the rates specified below of the Customs duties leviable on the under-mentioned articles imported into the Union shall be allowed, subject to the conditions set out in the Regulations attached to the Proclamation:—

Articles.	Amount of Rebate of Customs Duty.
Boiled linseed oil for use in the manufacture of rubber and rubber goods ..	17 per cent. *ad valorem*.
Turpentine (natural or synthetic) for use on the manufacture of paints, varnishes and polishes	17 per cent. *ad valorem*.
Sodium sulphide for use in the flotation process for the concentration of ores ..	The whole duty.
Castor oil and raw linseed oil for use in the soap making industry	The whole duty in the case of castor oil in bulk and 17 per cent. *ad valorem* in the case of raw linseed oil in bulk.
Linseed oil, linsidol and similar substitutes for use in the manufacture of paints for re-sale	17 per cent. *ad valorem*

Spain.—An order has the effect of reducing the duty on carbonate of calcium imported from the United Kingdom from 25 to 15 pesetas (gold) per 100 kilogs.

Belgium.—A translation of the new Belgian Customs Tariff, showing the rates of duty payable as from November 10 on British goods exported to Belgium, is published as a special Supplement with the *Board of Trade Journal* this week.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Industrial Furnaces.—A firm of commission agents at The Hague is desirous of obtaining the representation of British manufacturers of above. Correspondence in English. (This is a repetition of a notice of October 2.) (Reference No. 491.)

Chesterfield.—Tenders invited for construction of new sewage disposal works on the bio-aëration system. Plans and conditions from Mr. V. Smith, borough engineer, 2, Gluman Gate, before November 24.

Chemical Overseas Trade in October

The Board of Trade Returns issued as we go to press, show a total increase in imports, but a decrease in exports compared with last year. The same tendency is noted in the chemical trade. Imports were valued at £1,340,961, compared with last year's £1,600,475 and £1,317,012 the figure for September 1924. Exports in October were valued at £2,162,962, against £2,572,429 last October, and £1,897,455 in September 1924. Though last year's level is not reached the figures thus represent a satisfactory increase over the previous month.

Our usual detailed figures will be given next week.

Company News

ROPP TIN, LTD.—An interim dividend has been declared at the rate of 20 per cent., less tax, payable on December 16.

AMELIA NITRATE CO., LTD.—The directors announce a dividend of 15 per cent., less income tax, on the ordinary shares in respect of the year ended June 30 last. This is the first payment on the ordinary shares since 1921, when 7 per cent. was distributed.

A. AND F. PEARS.—The report for the year to June 30 last states that the profit was £87,291, which with £16,876 brought forward makes a total of £104,167. A dividend on the ordinary shares at the rate of 20 per cent. is recommended, leaving £13,767 to be carried forward.

WEARDALE LEAD CO.—For the year 1922-23 the report shows a net profit amounting to £22,432, compared with £14,802 for the preceding year. A final dividend is recommended of 2s. per share (10 per cent.), making 15 per cent. against 10 per cent., for the year. The sum of £8,152 remains to be carried forward.

SANTA CATALINA NITRATE CO.—The report for the year ended June 30 last shows a gross profit of £23,226. After deducting London expenses, etc., and providing for the interim dividend there remains £15,258. The directors propose to transfer £1,200 to reserve and to pay a further dividend of 15 per cent., 3s. per share, making 22½ per cent. for the year, carrying forward £2,208.

MAYS CHEMICAL MANURE CO.—In spite of the serious agricultural depression during the year, the chairman stated at the annual meeting held recently that the output of the company was greater than in the previous season, and the net profit for the twelve months was £1,170, to which was added the amount brought forward, making a total of £1,429. A dividend of 5 per cent. was declared.

WALL PAPERS MANUFACTURERS, LTD.—The profit for the year ended August 31 last is £751,852. After payment of debenture interest and preference dividend the directors recommend a final dividend of 6 per cent. on the ordinary shares, making 10 per cent, for the year, a dividend of 10 per cent. and a bonus of 2½ per cent. on the deferred shares, a special reserve for income tax of £25,000, and a transfer to general reserve of £200,000, carrying forward £267,040.

NIGERIAN BASE METALS CORPORATION.—The report for the year ended June 30 last states that a reorganisation of capital is essential. The directors have been able to arrange, subject to necessary reduction of face value of shares to provide for past losses, that principal creditors will accept payment in full in shares at par. Careful consideration has satisfied the directors that the capital now unrepresented by assets can fairly be placed at £180,403, or 4s. per share. No dividend has yet been paid by the company.

BRITISH-AMERICAN NICKEL CO.—It is reported from Toronto that as the result of an action against the British-American Nickel Co. by the National Trust Co. to protect the security of a $6,000,000 bond issue, the court has ordered the former to be placed in liquidation, with the latter as liquidators. The action is an attempt to merge the properties in Quebec and Ontario in one block, all the company's assets being covered by the bond mortgage. The National Trust Co. will not have the distribution of the assets unless the surplus realised is over $6,000,000.

LIVERPOOL NITRATE CO., LTD.—The report for the year ended June 30 last states that the balance from the previous account was £40,816. After deducting the final dividend paid November 29, 1923, calling for £22,286, and adding the profit for the year ended June 30, 1924, £108,157 the total is £126,687. Directors have written off properties £24,283, transferred to reserve account £24,669, and paid an interim dividend of 1s. 6d. per share, less tax, absorbing £20,343, leaving a balance to be dealt with of £57,392. The directors now recommend a final dividend of 3s. per share, less tax, making 4s. 6d., less tax, for the year.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information can be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to December 5, 1924.

"ERCALENE."

450,159. For lacquers. W. Canning and Co., Ltd., 133, to 137, Great Hampton Street, Birmingham; manufacturers. July 12, 1924. (By consent.)

"PLUTOPHOS."

451,617 For fertilisers. Gough's General Distributing Co., Ltd., 84, Above Bar, Southampton, Hampshire; manufacturers. September 5, 1924.

"STREETCO."

450,332. For chemical substances used in manufactures, photography, or philosophical research and anti-corrosives. Leslie Allan and Co., Ltd., Rainford Works, Rainford, Lancashire; refiners and distillers of petroleum and tar products. July 18, 1924. (To be associated, Section 24.)

"UNACHROME"

450,962 For vegetable colouring matters and dyestuffs. Class 4. Brotherton and Co., Ltd., City Chambers, Infirmary Street, Leeds; chemical manufacturers. August 11, 1924. (To be associated, Section 24.)

449,135. For chemical substances used in manufacture, photography, or philosophical research, and anti-corrosives, but not including glue, and not including any goods of a like kind to glue. Clifford Christopherson and Co., 6, Lloyds Avenue, London, E.C.3; chemical merchants.—June 10, 1924. (To be Associated, Sect. 24.)

"ENSULITE."

448,632. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Columbia Graphophone Company, Limited, 102 to 108, Clerkenwell Road, London, E.C.1; manufacturers. May 23, 1924. (To be Associated. Sect. 24.)

"SUBOX."

449,686. For paints, pigments, colours and anti-corrosives. Class 1. "Subox" Aktiengesellschaft Electro-Chemische Fabrik (a Joint Stock Company registered under the laws of the Swiss Confederation), 187, Langstrasse, Zurich, Switzerland; manufacturers of metal products. June 27, 1924.

"COLORBITU."

450,499. For paints. The Graphite Oils Company, Limited, Immingham Dock, Lincolnshire; manufacturers. July 25, 1924.

"CASTLEHOLM."

451,766. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. W. H. Holmes & Sons, Portland Road, Newcastle-on-Tyne; paint and colour manufacturers, merchants and importers. September 11, 1924. (To be Associated. Sect. 24.)

"HOLMCASTLE."

451,767. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. W. H. Holmes & Sons, Portland Road, Newcastle-on-Tyne; paint and colour manufacturers, merchants and importers. September 11, 1924. (To be Associated. Sect. 24.)

"BITNAMEL."

452,146. For paints, enamels and varnishes. Class 1. Pickles, Ayland & Company, Limited, Sowdill Works, Wesley Street, Ossett, Yorkshire; manufacturing chemists. September, 25, 1924.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

ALLEN, R. G., 19, Hawthorn Grove, Heaton Moor, manufacturing perfumer. (C.C., 15/11/24.) £19 19s. 4d. June 28.

CLARK (JOHN J.), LTD., 1, St. Thomas Street, S.E., and 18, Southwark Street, S.E., chemists. (C.C., 15/11/24.) £10 14s. 6d. October 8.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BARRETT (CHAS.) AND CO., LTD., London, E. Dyers. (M., 15/11/24.) Registered October 24, mortgage to National Provincial Bank, Ltd., securing all moneys due or to become due to the Bank; charged on Collingwood Works, Collingwood Road, Walthamstow, with plant, etc.

Satisfaction

FERBER (ROBERT), LTD., London, S.E. Manufacturing chemists. (M.S., 15/11/24.) Satisfaction registered October 30, £7,000, registered April 15, 1921.

New Companies Registered

AITKEN, DOBELL, LTD., 430, Tower Building, Water Street, Liverpool. manufacturers of chemicals and manures; distillers, dye makers, etc. Nominal capital, £3,000 in £1 shares (1,500 8 per cent. cumulative preference).

ASHBY CONTRACTORS, LTD. Quarry owners, brick and chemical manufacturers. Nominal capital, £5,000 in £1 shares. A director: A. J. Ashby, 213, Westmorland Road, Newcastle-on-Tyne.

BRITISH POTASH INDUSTRIES, LTD., 4, London Wall Buildings, Blomfield Street, London. To acquire and work any mines, quarries, etc., and to carry on the business of manufacturers of chemicals and manures; chemists, druggists, distillers, gas and dye makers, metallurgists, etc. Nominal capital, £25,000 in 40,000 10 per cent. cumulative participating preference shares of 10s. and 40,000 ordinary shares of 2s. 6d.

OLEUM OILS, LTD. Manufacturers of oils, soap and margarine, dealers in oils and oleaginous and saponaceous substances, etc. Nominal capital, £5,000 in £1 shares.

OSMONDS FERTILISER CO., LTD., Doughty Road, Grimsby. Manufacturers, importers and exporters of and dealers in all kinds of chemical and other artificial manures and fertilisers. Nominal capital, £5,000 in £1 shares.

W. J. HOLLAND, 26, East Parade, Bradford. Drysalters, chemists, druggists, oil and colourmen, etc. Nominal capital, £5,000 in £1 shares.

The German Lignite Industry

THE following figures, taken from the *Deutsche Bergwerks-Zeitung*, show the importance of the Rhenish lignite field to Rhenish and Westphalian industry. In 1913 Germany produced 190 million tons of pit coal; in 1922, 130 millions (*i.e.*, 32 per cent. less). In 1913 the German lignite production totalled 87 million tons; in 1922, 137 million tons (*i.e.*, 58 per cent. more). The Ruhr coal production fell 16 per cent. in the same period, while the Rhenish lignite production increased 85 per cent., from 20 to 37 million tons.

The German Nitrogen Industry

A SURVEY of the European nitrogen situation has been issued by the American Department of Commerce. The post-war progress of the nitrogen from air industry in Germany is dealt with, and according to the report at the end of the war the air-nitrogen industry in Germany was still expanding. The Piesteritz cyanamide plant was then unfinished and the Merseburg synthetic ammonia plant was not in full operation. Both these plants were subsequently completed. The cyanamide plant which had been built at Chorzow, in Upper Silesia, went to Poland in the territorial adjustments following the war. The Oppau-Knapsack plant, after remaining idle for a few years, was converted into a power plant. In 1920 the Government's Piesteritz plant was transferred to the Mitteldeutschen Stickstoffwerke A. G.

The approximate production capacity of the air-nitrogen industry in Germany at present is given in the following statement:

	Metric Tons.
By direct synthetic ammonia process:—	
Badische Anilin und Soda-fabrik, Oppau	100,000
Ammoniawerke Merseburg, Merseburg	200,000
By cyanamide process:—	
Mitteldeutsche Stickstoffwerke, Piesteritz	30,000
A. G. für Stickstoffdünger, Knapsack	12,000
Bayrische Stickstoffwerke, Trostberg (Margaretenberg)	30,000
Lonzawerke, Waldshut	12,000
By arc process:—	
Elektro-Nitrum A. G. Rhina	4,000
Elektrosalpeterwerke, Mulden tein	2,000
By coke and gas works: Combined capacity	100,000
Total fixed nitrogen	490,000

It should be pointed out that since the production capacity for calcium carbide in Germany is considerably greater than corresponds to the cyanamide production capacity, it would be relatively easy for Germany to increase fixed nitrogen production by means of carbide if desirable. The drift of industry is in the other direction, however, for fixed nitrogen can be obtained more cheaply by the direct synthetic ammonia processes, whereas both carbide and cyanamide are finding more extensive use as the raw materials for manufacturing a variety of chemical products. The actual production of fixed nitrogen in Germany is considerably less than the capacity production. Complete data is not available, but there may be assembled from various sources sufficient facts to make fairly accurate estimates of actual production for several post-war years in comparison with that of 1913. The data of the accompanying table is, therefore, tentative.

Production of Fixed Nitrogen in Germany. (In Metric Tons.)

Produced from	1913	1920–21	1921–22	1922–23
Coal-gas and coke works ..	110,000	70,000	90,000	75,000
Cyanamide plants ..	5,000	50,000	47,000	35,000
Synthetic ammonia plants	7,000	110,000	170,000	210,000
Total fixed nitrogen ..	122,000	230,000	307,000	320,000

German Dye Cartel's Capital

THE combined share capital of the dye plants included in the German Dye Cartel will be below 1,000,000,000 gold marks after the change into paper marks has definitely taken place. It has been emphasized, however, that some of the concerns, notably the Badische Anilin und Soda-fabrik, will have a considerable sinking fund once the conversion is made. The net ratio of conversion, as announced by Dr. Carl Ungewitter, of the Dye Cartel's Berlin offices, will be 1 gold mark share for 50 paper mark shares, the capitalisation of the individual members of the Dye Cartel being:—

	Gold Marks.
Hoechster Farbwerke	176,000,000
Badische Anilin Co.	176,000,000
Friedrich Bayer & Co.	176,000,000
A. G. Fuer Anilinfabrikation	59,600,000
Weiler-ter-Meer	13,460,000
Leopold Casella A. G.	60,880,000

The aggregate capitalisation is 705,940,000 gold marks. The Hoechst company is said to have large reserves on deposit in New York banks.